

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE

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Critical Points (GENERAL)

1. A CVC is defined as any venous catheter that terminates in the central vasculature, such as the superior vena cava (SVC) or inferior vena cava (IVC).
2. Indications for CVCs in children include the following:
 - Central venous pressure measurement
 - Delivery of medications to the central circulation
 - Rapid infusion of large volumes of fluid or blood products
 - Administration of high-concentration parenteral nutrition
 - Administration of medications that ideally should not be infused peripherally
 - Exchange transfusions

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

- Provision of access in children lacking peripheral sites who require intravenous therapies.
3. RNs who have been educated and trained in this procedure may care for patients with CVCs. Critical care and ambulatory practice RNs who have demonstrated competency in CVC removal may perform CVC removal procedures in their respective settings, with the exception of hemodialysis and Percutaneous Sheath Introducer (aka, 'cordis') CVCs.
 4. Prior to caring for any central line, determine the type of CVC.
 - **Do not use this procedure if catheter type is**
 - **Dialysis Catheter** for continuous renal replacement therapy (CRRT) intermittent hemodialysis/apheresis therapies.
 - Refer to the [Large-Bore Vascular Access Catheter Care \(General\)](#) nursing procedure.
 - **Transthoracic Intracardiac Catheter.**
 - Refer to [Cardiothoracic Surgery Patients with Transthoracic Intracardiac Catheters, Care of Cardiac ICU](#) unit procedure.
 5. Newly inserted CVCs require radiographic verification of catheter tip location prior to use, and a provider order confirming readiness for use. CVCs should have the distal tip dwelling within the lower one third of the superior vena cava (SVC) or near its junction with the right atrium. Those placed via the femoral vein, should have the distal tip dwell in the inferior vena cava (IVC) above the level of the diaphragm (INS, 2016), with the exception of neonates for whom the tip is left lower in the IVC due to concern for inadvertent tip advancement into the atrium with flexion.
 6. Newly admitted patients with an existing tunneled central catheter or implanted vascular access port require documented verification of catheter tip location from the outside institution prior to use. If this is not available, or there is any concern about catheter function or position, radiographic verification is required.
 7. Patients admitted with prior radiographic verification of a *tunneled central catheter or implanted vascular access port* at BCH do not require repeat radiographic verification. Verification of catheter presence in venous system is confirmed by blood return and catheter function. If there is any concern about catheter function or position, a radiographic exam should be performed.
 8. Patients admitted with prior radiographic verification of a *PICC* at BCH or an outside institution require verification of central catheter tip location via either: a) radiographic verification (preferred); or b) a dressing change to visualize external catheter length to compare to previously documented verified length, in addition to positive blood return and appropriate catheter function. **A provider order confirming readiness to use CVC is needed.**
 9. Midline Catheters are generally not inserted in BCH, however may be seen.
 - a. A midline catheter is one where the tip is outside of a central vein. It is NOT considered to be a central venous catheter.
 - b. Medication administration: Use [Peripheral IV Catheter Insertion, Maintenance, and Removal \(Neonatal/Pediatric\) Procedure](#).
 - c. Site care and Dressing Change: Varies by manufacturer. Consult your Clinical Nurse Specialist (CNS)/Advanced Practice Nurse (APN).
 - d. Flush-locking: Varies by manufacturer. Consult your CNS/APN.
 10. Only trained personnel may administer intravenous contrast media via a CVC. See [Intravenous Access for Contrast Administration for CT/MRI \(Neonatal/Pediatric\)](#).
 11. Avoid non-invasive blood pressure monitoring on any extremity with a CVC.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

12. Patients with femoral non-tunneled catheters should not ambulate, but are permitted to be out of bed to commode or chair, with assistance of RN/PCA. This is to avoid new or increased oozing from site and/or inadvertent dislodgement of catheter.

Central Venous Non Tunneled Catheter: Insertion Assist

CRITICAL POINTS

1. Limit the number of people present in the procedure location to those necessary to accommodate a safe insertion. Minimize personnel traffic near procedure area.
2. Sterile technique and maximal sterile barrier precautions must be used throughout the procedure.
 - The only exception is when medical necessity requires patient's head be undraped to allow continuous visualization of the airway.
 - All clinicians participating in CVC insertion wear mask, sterile gown, sterile gloves, and hair cover. All hair must be contained in hair cover.
 - All other staff and family members within three feet of the sterile field wear masks and hair cover.

SUPPLIES

- Masks, sterile gowns, hats, sterile gloves, protective eyewear
- Chlorhexidine (ChloroPrep). If patient is sensitive to chlorhexidine or it is contraindicated, use povidone-iodine
- Sterile drapes/towels
- Central venous catheter and insertion kit (provider to choose appropriate size catheter)
- Local anesthetic: 1% Lidocaine (provider order required)
- Analgesic and/or sedation medications (provider order required)
- 0.9% sodium chloride (NaCl) solution **OR** 0.9% NaCl solution with heparin 1 unit/mL (for use by provider to prime catheter; solution with heparin requires provider order)
- Sterile labels and pen for labeling syringe of priming solution
- Appropriate suture material (obtained by provider), if needed
- CVC dressing kit, or dressing materials
- Injection cap
- IV extension set (for Argon PICCs due to lack of clamp)

PROCEDURE

1. Provide patient and family education regarding procedure, need for analgesia/sedation, sterile field and patient positioning.
2. Consult with Child Life staff as necessary for procedural support.
3. Provider to obtain consent per hospital policy.
4. Gather supplies.
5. Clean work surface with hospital-approved surface disinfectant.
6. Perform hand hygiene.
7. Administer analgesia and sedation per provider order.
8. Assist with patient positioning based on the cannulation site.

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9. Perform time out and site verification (Universal Protocol).
10. Monitor for complications of CVC placement (See: [Patient Assessment](#): Post Insertion)
11. Ensure sterile dressing is applied to insertion site following catheter insertion.
12. Attach primed sterile IV extension set to PICC (when indicated).
13. Attach primed sterile injection cap to extension set (PICC) or catheter hub.
14. Coordinate post-procedure radiographic confirmation of catheter tip placement.
15. Obtain provider order to use CVC following radiographic verification of placement.

Central Venous Catheter Care & Maintenance

CRITICAL POINTS

1. Perform hand hygiene immediately prior to the care, handling or maintenance of any CVC.
2. Avoid addition of stopcocks to the hub or administration sets of CVCs whenever possible.
3. Use only luer-lock devices for CVC connections.
4. Use 10 mL syringes to flush CVCs. Syringes of a smaller barrel diameter than 10 mL syringes exert excessive pressure and may result in blood vessel and/or catheter damage.
5. A physician order is required for all CVC infusion rates. In general, CVCs are infused at a minimum rate of 1 to 10 mL/hour depending on patient age and type of catheter (PICCs are generally not infused at a rate less than 1 mL/hour and tunneled catheters not less than 10 mL/hour, or 5 mL/hour if fluid-restricted in bigger patients, or 1 mL/hour in neonates).
6. Assess catheter function by instilling flush or verifying blood return prior to each infusion of fluids or medication.

PATIENT ASSESSMENT

1. **Post-Insertion**
 - a. Assess site for excessive bleeding or drainage.
 - b. Assess patient for potential post-insertion complications. If present, notify provider:
 - i. Pneumothorax: Symptoms include pleuritic chest pain, dyspnea, tachypnea and hypoxia.
 - ii. Hemothorax: Symptoms include respiratory distress, decreased or absent breath sounds.
 - iii. Transient Arrhythmias: Patients at risk include those in the critical care/transitional care units with congenital heart disease and a history of cardiac arrhythmias.
 - iv. Cardiac Tamponade: Symptoms include retrosternal or epigastric pain, shortness of breath, venous engorgement of face and neck, restlessness, confusion, tachycardia, hypotension, decreased capillary refill, and cardiac arrest.
2. **Initial Assessment** (i.e., at beginning of each shift)
 - a. CVC insertion site or implanted port pocket: Abnormal findings include erythema, swelling, drainage or leaking. These are signs of a potential infection; inform provider.
 - b. Surrounding tissue and along track of catheter: Assess by visual inspection and palpation through the intact dressing and via patient report. Abnormal findings include redness, tenderness, swelling, burning or itching. These are signs of potential infection, infiltration, site cleanser (e.g., chlorhexidine) or dressing sensitivity/allergy. The dressing will likely need to be changed to thoroughly assess site.
 - c. Position of dacron cuff in tunneled catheters: Abnormal findings include visibility of cuff at catheter exit site. This is a sign of possible catheter migration; inform provider.

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- d. Sutures: Abnormal findings include sutures that are loose, or no longer anchored in the skin; signs of infection. If sutures are no longer intact, ensure alternative catheter securement is in place. Inform provider if infection suspected.
 - e. Dressing: Abnormal findings include a dressing that is wet (sometimes apparent with “puffy” Biopatch), loose or soiled. If it has been less than 48 hours since catheter placement, reinforce (see [Site Care and Dressing Change](#) section below). If greater than 48 hours, change dressing and assess for oozing at site.
 - f. Stress loop/securement device: Abnormal findings include absence of a stress loop/securement device/additional securement on a PICC, tunneled or non-tunneled catheter.
 - g. CVC dressing, lumen(s), cap and tubing contamination risk: Refer to [Troubleshooting](#) section and [Appendix C](#) of this procedure for prevention measures.
 - h. Unexplained ascites and abdominal distension: May indicate a slow extravasation of blood or parental nutrition.
3. **Ongoing Assessment** (i.e., throughout shift)
- a. CVC insertion site, surrounding tissue, dressing integrity, and catheter securement is assessed throughout the shift with routine patient assessment, and when catheter is used for medication or solution administration.
 - b. CVC dressing, lumen(s), cap and tubing contamination risk. See [Troubleshooting](#) section and [Appendix C](#) for prevention measures.
 - c. When CVC is flushed or heparin-flush locked, catheter patency and ease of flushing are assessed. Consider Alteplase early for sluggish blood return.
4. **Indications for Patient’s CVC**
- a. Nurses participate in daily team discussions regarding the use, function and continued need for the CVC(s). When indications of need are no longer present, the plan for CVC removal should be discussed and documented.
5. **Documentation**
- a. Initial assessment is documented. Any abnormal findings are discussed with the provider.
 - b. Any abnormal findings during the ongoing assessment are documented and discussed with the provider.
 - c. Document *Daily Assessment of Need for Central Line* in the medical record.
 - d. Document all CVC care procedures performed, including dressing change, cap change, tubing change, port access/deaccess, blood sampling, alteplase administration and catheter repair.

Site Care and Dressing Change

CRITICAL POINTS

1. **Biopatch**, a chlorhexidine-impregnated sponge, continually releases CHG and inhibits bacterial growth for up to 7 days. Refer to [Biopatch application](#) steps in procedure below. Biopatch is used at the exit site of all tunneled and non-tunneled CVCs, with the following **exceptions**:
 - a. Tunneled and non-tunneled CVCs: Patients less than (<) 27 weeks corrected age, < 1000 grams and < 1 week of age.
 - b. PICC: All infants less than 2 months of age (48 weeks corrected gestational age).
 - c. Implanted vascular access devices (i.e., ports).
 - d. Any patient with a known allergy or sensitivity to Biopatch.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

2. CVC insertion site that is irritated, infected or with non-intact skin. **Chlorhexidine gluconate (CHG)** is the preferred skin antiseptics for CVC dressing site care, with the following **exceptions**:
 - a. Neonates < 27 weeks corrected age, < 1000 grams and < 1 week of age.
 - b. Any patient with a known allergy or sensitivity to CHG.
 - c. Any CVC site that is irritated, infected or with non-intact skin.
3. **PICCs** will often have **SecurePortIV** tissue adhesive applied at the time of insertion. This is a clear tissue adhesive that seals the catheter insertion site and secures the catheter. Benefits include: Decreased catheter migration, prevention of oozing at the site, and establishment of a microbial barrier.
 - a. SecurePortIV is intended to be left on the skin and will gradually wear away during the skin's natural sloughing process (typically over 5-7 days).
4. As an alternative to SecurePortIV, some PICCs will have **StatSeal**, a topical hemostatic agent, applied at the time of insertion in either powder or disc form. StatSeal dehydrates plasma and stacks dry cells to create a seal at the insertion site. Benefits include: stops bleeding or oozing, seals insertion site, minimizes catheter migration, and prevents need for gauze, minimizing dressing changes.
 - a. StatSeal discs look similar to Biopatch, but are labeled with "StatSeal". StatSeal powder looks like brown sugar in appearance. A StatSeal label will be present on initial dressing when the powder is used.

StatSeal Powder



StatSeal Disc

**DRESSING CHANGE**

1. Newly-placed CVC (i.e., first 48 hours)
 - a. A Biopatch will be placed on surgically-placed CVCs in the Operating Room (OR) and PICCs placed on the units following insertion, except when contraindicated, as above.
 - b. **Tunneled catheter:**
 - i. Avoid changing the dressing of a newly placed tunneled catheter, inserted in the OR, before 48 hours to minimize potential contamination of the wound. When gauze is used at the insertion site or the site is soiled, it is due to be changed at 48 hours.
 - ii. If the insertion site and dressing remain clean, dry, and intact, and no gauze is present it is routinely changed after 7 days.
 - iii. If the insertion site and dressing remain clean, dry and intact, and no gauze is present, it is routinely changed after 7 days.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

- iv. Reinforce newly inserted tunneled catheter dressings (1st 48 hours) that are wet or loose with sterile gauze and tape. Do not remove original dressing. Change dressing at 48 hours post CVC placement.
 - v. Notify provider, surgeon and/or CNS/APN of any excessive bleeding or other concerns at site of newly placed catheter.
 - vi. Consider use of StatSeal at site of tunneled catheter if bleeding persists.
- c. **PICC:**
- i. Change dressing of a newly placed PICC at 24 hrs if significant bleeding persists or the dressing (Biopatch or gauze) is saturated. If drainage is minimal and has ceased, wait to change dressing at 48 hrs.
 - ii. If insertion site and dressing remain clean, dry and intact, and no gauze is present, dressing is routinely changed at 7 days (exception: infants less than 48 weeks with PICC are changed PRN only).
 - iii. Notify surgeon or PICC inserter of any excessive bleeding or other concerns at site of a newly placed PICC.
 - iv. See [PICC Dressing Change instructional video](#) (Appendix D).
- d. **Non-tunneled CVC (E.g., IJ):**
- i. Use Sorbaview dressing for best securement.
 - ii. See [Non-tunneled CVC Dressing Securement instructional video](#) (Appendix D).
- e. See [Appendix D](#) for instructional videos on securement of HD Trialysis Catheters, MAC Introducer Catheters, and PSI Introducer Catheters
2. **Established CVC (i.e., after initial 48 hours)**
- a. A Biopatch will be used at the site of all tunneled and non-tunneled CVCs, except when contraindicated and in the case of an oozing insertion site or sensitivity to Biopatch/Chlorhexidine. Biopatches are not indicated for vascular access ports. StatSeal hemostatic agent will often be used in place of Biopatch until the first dressing change.
 - i. Biopatch comes in two sizes: 1" disc (*PMM 4150*) (in pediatric/adult CVC dressing kit) and ¾" disc (*PMM 4151*) (in neonatal CVC dressing kit).
 - ii. Select appropriate size Biopatch based on the size of transparent dressing that will be applied (i.e., small Biopatch disc for small dressing to ensure dressing adherence). Concentration of CHG throughout any cross section of the Biopatch for both sizes is the same.
 - b. PICC transparent dressings of infants less than 2 months/48 weeks corrected age will *not* include a Biopatch and will *not* be routinely changed in order to reduce risk of catheter dislodgement. Change these dressings when they become non-occlusive, damp or soiled. StatSeal powder or disc at insertion site does not influence timing of dressing change; i.e., change dressing only when non-occlusive, damp or soiled
 - c. The wings of BARD PowerLines (i.e., purple power-injectable tunneled line) are sutured to the skin at time of insertion, and should remain so for at least three weeks to allow for tissue adhesion to catheter cuff. At three weeks, a RN, CNS or NP familiar with the procedure, should remove the wing sutures (using suture removal kit) to allow for appropriate cleaning under wings and at insertion site, and apply a StatLock. Delay wing suture removal if site is oozing or catheter securement is otherwise in question.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

- i. When removing wing sutures: Perform skin antisepsis (CHG or Betadine) prior, remove sutures, and perform skin antisepsis again, now with ability to clean under wings.

Sutured PowerLine Wings



- d. Gauze dressing requires changing every two days.
- e. CVC dressing must be changed as quickly as possible (i.e., within the hour) if it has become non-occlusive, damp or soiled (e.g., oral secretions, emesis, urine, stool).
- f. If insertion site or surrounding skin is bleeding, oozing or weeping, change dressing and if continues to bleed/ooze or weep, apply gauze with transparent dressing, then change every two days.
 - i. CVC sites/dressings with new bleeding should be left intact (if otherwise clean and occlusive) for 48 hour after last noted oozing, and then the dressing changed. Premature or excessive dressing changes may promote continued bleeding.
- g. If dressing is intact immediately and *completely* surrounding insertion site (and Biopatch or port needle):
 - i. It is acceptable to reinforce a non-intact edge with tape (e.g., Medipore H or Multipore Dry tape).
 - ii. Application of Cavilon barrier film to the skin prior (for all dressings except IV Clear silicone dressing) will help with adhesion.
 - iii. Do not add an additional layer of transparent dressing over original dressing. This will trap moisture and may result in skin irritation or breakdown.
 - iv. Tunneled CVC insertion venipuncture wound dressing (i.e., gauze and transparent dressing) may be removed 2 days post CVC insertion. Leave steri-strips intact until they fall off on their own, typically one week to 10 days after insertion. The same applies for steri-strips just above a newly placed implanted vascular access port. Presence of this port insertion site telfa dressing does not equate to a gauze dressing, and does not require every 2 day changes.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)




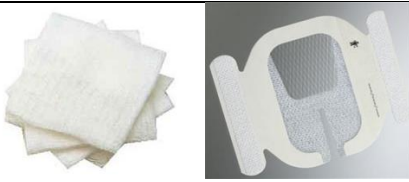
Table 1: Dressing Change Frequency

Type of Catheter	Dressing Components	Minimum Dressing Change Frequency
PICC (< 2 months/48 weeks corrected age)	Transparent dressing only	PRN
Tunneled, Non-Tunneled (all pt > 27 weeks gestation, > 1000 grams and > 7 days of age), PICC (> 2 months/48 weeks corrected age)	Biopatch and transparent dressing	Every 7 days
Tunneled, Non-Tunneled, PICC (all ages)	Gauze and transparent dressing	Every 2 days
Tunneled, Non-Tunneled, PICC (> 2 months/48 weeks corrected age)	Transparent dressing only (if Biopatch contraindicated)	Every 7 days
Implanted Vascular Access Port	Transparent dressing	Every 7 days (+ needle change)

Table 2: Dressing Options

Dressing	Description/Indication	Image
Tegaderm Advanced PMM #'s: 1680: 494197 1682: 882002 1683: 20445 1685: 29868	Our standard dressing (in CVC dressing change kits); diamond pattern with medipore cloth boarder. Rare to find patients who have a true sensitivity to this dressing. Use unless otherwise indicated.	
IV 3000 (aka Opsite) PMM #'s: 2½" x 2¾": 14174 4" x 4¾": 916763 4" x 5½": 14171	Transparent with 2 orange borders <ul style="list-style-type: none"> Tegaderm sensitivity Increased frequency dressing change protocols (e.g., daily with TBI) 	

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

Dressing	Description/Indication	Image
Tegaderm HP PMM #'s: Small: 19245 Large: 898843	HP = Holding Power <ul style="list-style-type: none"> Diaphoretic patients Issues with dressing adherence (e.g. chronic skin condition) 	
IV Clear PMM #'s: Small: 279355 Large: 70809	Silicone, antimicrobial dressing Impregnated with CHG and silver <ul style="list-style-type: none"> Non-draining skin irritation, blistering or non-intactness Patients with Tegaderm and/or IV 3000 sensitivity 	
Sorbaview PMM #: 75095	<ul style="list-style-type: none"> For IJ dressing and securement Has built-in securement system to help counter gravity pull of IJ catheter 	
Gauze/transparent dressing	<ul style="list-style-type: none"> Bleeding, oozing or weeping at/around insertion site Change every 2 days 	

SUPPLIES

- CVC dressing kit
 - Pediatric kit ([PMM 171424](#))
 - Infant kit ([PMM 250031](#))
 - NEO Betadine kit ([PMM 993018](#))
- Povidone-iodine swabsticks (if needed due to Chlorhexidine contraindication or sensitivity)
- Normal saline wipes to remove povidone-iodine (if needed)
- SecurePortIV (when applicable) ([PMM 165753](#))
- Statlock stabilization device (when applicable)
 - Statlock PICC Plus Tricot ([PMM 270326](#)) (for PowerLines and many PICCs)
 - Statlock PICC Neonate for Argon PICC ([PMM 42469](#))
 - Statlock PICC Neonate ([PMM 22145](#)) (for 2.6 Fr dual lumen PICC)
 - Statlock Dialysis ([PMM 16715](#)) (for dual lumen non-power tunneled catheters)

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)**PROCEDURE (INFANT OR PEDIATRIC CVC DRESSING)**

NOTE: If patient has **sensitive skin, skin breakdown, or drainage, do not use a Biopatch**. Consult CNS/MD/NP. Apply IV Clear dressing for sensitive, non-intact skin, and gauze/transparent dressing for site with drainage or transparent dressing only if desire to visually monitor site.

1. Gather CVC dressing kit, any additional supplies, and a second person if performing PICC dressing change.
2. Explain procedure to patient and family.
3. Clean work surface with hospital-approved disinfectant.
4. Perform hand hygiene.
5. Open outer wrap of dressing kit; unfold pocketed drape.
6. Open drape and place under patient's catheter.
7. Don mask and provide one to patient and everyone involved in dressing change.
8. Perform hand hygiene and don gloves.
9. PICC dressing changes require two persons.
 - a. Upon dressing removal, second person secures catheter with a sterile gloved finger at or just distal to insertion site.
 - b. For small (e.g., 1.9 Fr, 2.8 Fr Argon or 2.6 Fr Medcomp) PICCs that are very susceptible to migration, have second or additional helper exert gentle pressure to inner arm, proximal to PICC insertion site and over vessel, to help stabilize catheter.
10. Using adhesive remover, remove dressing and Biopatch, if present, releasing dressing toward insertion site.
11. Assess site for redness, swelling, skin breakdown, tenderness, drainage, and integrity of sutures, if present.
12. Assess external catheter:
 - a. Tunneled catheters (e.g., Broviac): Ensure cuff is not visible. A visible cuff ([Figure A](#)) is indicative of catheter migration and must be reported to provider.

Figure A



CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

b. PICCs:

- i. Note external centimeter (cm) marking/length of the catheter to the nearest 0.5 cm and document in the IV Assessment flowsheet. Compare this to the initial cm marking. Any change in external length may be indicative of catheter migration (in or out) and must be reported to provider (Figures B, C & D).
- ii. Cook Antimicrobial PICCs lose their black cm markings over time. In this case, use a sterile tape measure (PMM 16973) to measure from where the orange color starts as zero (Figure E).

Figure B

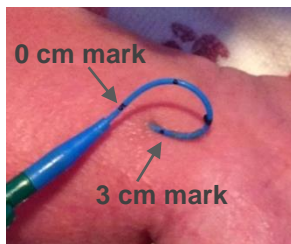


Figure C

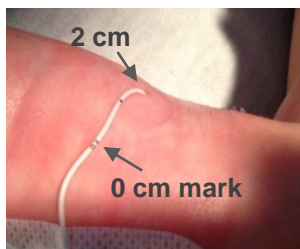


Figure D

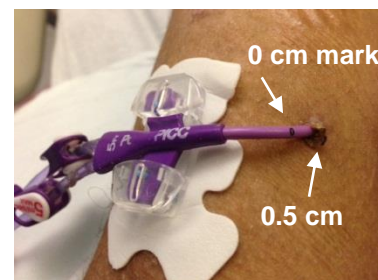
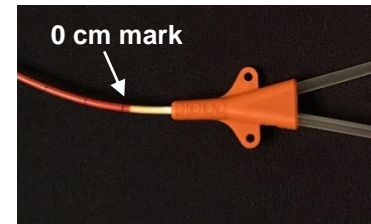


Figure E



- During every dressing change, note and document external cm marking to the nearest ½ cm (Figure B = 3 cm; Figure C = 2 cm; Figure D = 0.5 cm).
- Compare this value to the initial documented external marking. Alert provider of any discrepancy.
- The first marking from the catheter hub or wings is always **zero** (disregard any visible numbers; only count markings).

13. If Statlock present: Remove Statlock.

- a. Dissolve Statlock anchor pad by swabbing the undersurface with alcohol.
- b. Fold adhesive anchor piece underneath to prevent Statlock from re-adhering to skin.
- c. Stabilize CVC/Statlock device while lifting the Statlock retainer doors, if present.
- d. Carefully remove PICC catheter wings from Statlock device.

14. Remove gloves and perform hand hygiene.

15. Open inner pocketed drape.

16. Place any additional supplies on sterile field.

17. Perform hand hygiene and don sterile gloves.

18. Perform skin antisepsis with CHG (unless contraindicated).

- a. Use first ChlorPrep swabstick to remove any dried blood or exudate* from insertion site.
- b. If present, do not remove StatSeal "scab" or seal at insertion site; gently clean with ChlorPrep on StatSeal and around insertion site.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

- c. If there is an indication to remove the StatSeal “scab” or SecureportIV (i.e., Provider/PICC team needs to pull back line):
 - i. * StatSeal: moisten the dried material with sterile saline or water to aid in removal
 - ii. * SecureportIV: use CHG to aid in removal
 - d. Cleanse with remaining two ChloroPrep swabsticks using a back and forth motion around the CVC insertion site and slightly larger than the area that the dressing will cover for a minimum of 30 seconds.
 - e. Allow site to completely dry. Do not blow, fan or blot/wipe with gauze.
19. If Chlorhexidine is contraindicated, disinfect site with **povidone-iodine**.
- a. Remove any dried blood or exudate* with alcohol prep pad.
 - i. *Do not remove StatSeal “scab” or seal at insertion site; gently clean with povidone iodine on StatSeal and around insertion site.
 - b. If there is an indication to remove the StatSeal “scab” or SecureportIV (i.e., Provider/PICC team needs to pull back line)
 - i. * StatSeal: moisten the dried material with sterile saline or water to aid in removal.
 - ii. *SecureportIV: use povidone-iodine to aid in removal.
 - c. Cleanse area with povidone-iodine using circular motion working out from insertion site to include an area slightly larger than the area the dressing will cover; repeat with remaining two swabsticks.
 - d. Allow to dry for at least two minutes. Do not blow, fan or blot/wipe with gauze.
 - e. When dry, remove Povidone-iodine with sterile saline wipes using a circular motion.
 - f. Blot dry with gauze.
20. Apply Cavilon skin prep to area slightly larger than where dressing and Statlock, if using, will be applied. Allow to dry for 30 seconds. Do not apply Cavilon when using IV Clear silicone dressing.
21. Apply Statlock:
- a. **Statlock PICC Plus Tricot**: Position Statlock with arrows/notch facing toward catheter exit site. Place suture holes of PICC wings over the posts and close retainer doors before adhering to patient’s skin.
 - b. **Statlock PICC Neonate for Argon PICC**: Position Statlock with arrows pointing toward catheter exit site. Push catheter, with wings proximal to stabilization device, into white groove (Figure F).
 - c. **Statlock PICC Neonate (for 2.6 Fr PICC)**: Position Statlock with arrows pointing toward catheter exit site. Place suture holes of PICC wings over the posts and click into place (Figure G).
 - d. **Dialysis Statlock (for dual lumen non-power tunneled lines)**: Place bifurcation of two lumens into Statlock and close door until it clicks before adhering to patient’s skin.

Figure F: Statlock Neonate for Argon**Figure G: Statlock Neonate for 2.6 Fr**

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

- e. Angle Statlock toward insertion site at a 45° angle and peel away paper backing from anchor pad placing Statlock pad on skin, one side at a time.
- f. Assess whether both catheter exit site and Statlock can be completely and occlusively covered with single dressing (Figure H). If not, Statlock may remain uncovered (dressing not necessary – Figure I) unless neonatal/infant Statlock when it must be covered with a separate transparent dressing (Figure J)

Figure H



Figure I



Figure J



22. For PICCs in children less than 6 years of age, or those at risk for catheter migration, and for any other catheter at risk for migration, apply SecurePortIV to insertion site.
 - a. Ensure all skin prep solutions are dry and that bleeding has stopped. If insertion site is oozing blood, apply pressure for at least two minutes before applying SecurePortIV
 - b. Peel open pouch and drop applicator onto sterile field.
 - c. To activate the applicator, point the tip towards the ceiling and press the bottom of the applicator upward.
 - d. Invert the applicator and gently squeeze the ridges along the tapered applicator tip to initiate adhesive flow. Ensure sterile finger that is securing PICC is away from insertion site and does not come into contact with adhesive.
 - e. Apply one drop of adhesive to the catheter at the insertion site. It helps to touch the tip of the applicator to the catheter to control location of the adhesive drop. Allow 10 seconds to set.
 - f. Apply a second drop to the catheter at the insertion site, ensuring the glue has surrounded the entire circumference of the catheter exit site. Allow 10 seconds to set. A third drop may be applied.
 - g. Allow final adhesive drop to set for approximately 30 seconds before applying Biopatch, if using.
 - h. It is not necessary to remove any residual adhesive between dressing changes.

Activation of SecurePortIV

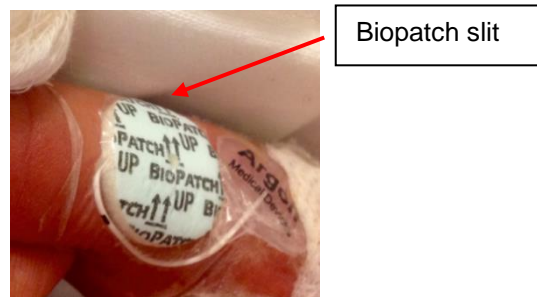


Application of SecurePortIV



CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

23. Apply Biopatch (unless contraindicated) blue side up with center of patch over insertion site and slit aligned with catheter (Figure K). This is appropriate for tunneled and non-tunneled catheters with exception of PICCs, due to risk of catheter dislodgement.
- a. **Exception:** Place Biopatch at the catheter exit site on top of the PICC line (Figure L) of infants greater than or equal to 2 months/48 weeks corrected age. Do not align slit with catheter. This is to avoid inadvertent dislodgement of central line during future dressing change.

Figure K: Tunneled Line**Figure L: PICC**

- b. Add Biopatch (unless contraindicated) with first dressing change after StatSeal use.
24. Orient dressing notch with catheter and apply dressing using gentle pressure from insertion site outward. Press dressing border with fingers while removing paper backing. After dressing fully applied, use gentle pressure to smooth dressing around insertion site and Biopatch, working out to the borders to aid in dressing adhesion.
25. Apply Cavilon to edge of dressing border (except in the case of IV Clear silicone dressing) where it meets skin to help seal dressing to skin. Use Medipore tape strips to secure stress loop outside dressing, when another form of securement is not used.
26. Write current date on date-change label and apply to dressing border. Do not rely on Kardex information to determine date in which dressing is due to be changed.
27. Discard gloves and all supplies.
28. Perform hand hygiene.
29. Document dressing change procedure in patient's medical record.
30. Document site assessment (including PICC length, as applicable) and report abnormal findings to provider.
31. Inform CNS/APN if encounter issues maintaining an intact dressing for desired time period (i.e., one week for non-gauze transparent dressing).

 tubing Change**CRITICAL POINTS**

- Mask and sterile gloves are worn whenever the lumen of the CVC is OPEN to air.
 - Applies to tubing changes that occur at catheter hub that is not capped with needleless connector.
 - Does NOT** apply to lines that are connected with a closed system transfer device (e.g., Spiros) OR when injection cap is present.
- When priming tubing, do so into packaging from which tubing came, on disinfected surface. **Do not** prime over/into waste receptacle or sink.
- Utilize **passive disinfectant protectors** (i.e., DualCap) on all CVC tubing and needleless connectors.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

- a. Add male passive disinfectant protector (i.e., dark blue DualCap) to the male end of newly primed tubing until ready to attach to patient's catheter (unless immediately attaching to patient after priming), and all tubing after disconnection from patient if reserving for future use.
- b. Add needleless passive disinfectant protector (i.e., light blue DualCap) to all needleless connectors (e.g., injection caps of heplocked lumen, bi/tri/quadfuse arms, tubing side ports, syringe pump tubing) when not in use.
 - i. Avoid over-tightening. It is *not* necessary for the light blue DualCap to be fully engaged – alcohol will bathe the top of the needleless connector to disinfect upon contact.
 - ii. Do not use in place of an injection cap on any open CVC lumen hubs or stopcocks.
- c. Both disinfectant protectors are single-use; discard immediately after removal to access catheter or tubing, and replace with a new protector after each access of a needleless connector.
- d. Continue to scrub the hub/needleless connector for 10 seconds and allow to dry for 10 seconds before every access (i.e., after removal of DualCap). Use of the passive disinfectant protectors is an adjunct to the access procedure.

DualCaps:

4. Do not prepare/prime new tubing with injection cap on end.
5. An injection cap is bonded to the distal end of the syringe pump tubing to maintain a closed system during syringe connection/disconnection and allow for a surface to disinfect before access.
6. An injection cap is placed on the hub of all CVCs, and bonded on bi, tri and quadfuse tubing extensions to maintain a closed system during connection/disconnection.

SUPPLIES

- Mask (if needed)
- Clean or sterile gloves, as appropriate
- Alcohol prep pads
- Primed tubing (with passive disinfectant protector on end)
- DualCap male/dark blue protector (*PMM 69942*)
- DualCap needleless connector/light blue protector (*PMM 69941*)

PROCEDURE

1. Gather Supplies.
2. Clean surface with hospital-approved disinfectant.
3. Don mask (if will be exposing open hub of catheter) and perform hand hygiene.
4. Open supplies.
5. Perform hand hygiene.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

6. Don sterile gloves (if will be exposing open hub of catheter).
7. Hold catheter near cap/tubing connection.
8. Disconnect tubing and set aside.
9. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
10. Remove passive disinfectant protector from new tubing and discard.
11. Secure new tubing onto injection cap of catheter, or bi/tri/quadfuse.
12. Perform hand hygiene.
13. Label new tubing with date and time of tubing change and initials. Do not rely on Kardex information to determine date in which tubing is due to be changed.
14. Document tubing change procedure in patient's medical record.

Cap (i.e., Needleless Connector) Change

CRITICAL POINTS

1. Injection caps, also known as needleless connectors, are placed on the hub of all CVCs, regardless of plans to access. Pressure monitored lines are an exception.
2. Perform cap change procedure using designated cap change kit (single or double) to ensure optimal aseptic conditions and ease of access to necessary supplies.
3. When line is infusing or during intermittent use, injection cap must be changed every 4 days, and at least as frequent as the primary administration tubing.
 - a. Refrain from changing cap with tubing change if cap already changed that same calendar day (e.g., previous cultures)
7. Injection caps must be changed when visible blood or debris cannot be flushed from the cap or anytime cap is soiled, removed (e.g. for blood cultures), or upon contamination.
8. A needleless passive disinfectant protector (i.e., light blue) must be added to all unused needleless connectors, including tubing side-ports, bi/tri/quadfuse arms and heparin-locked catheter lumens.
9. When line is heparin-locked and not in use for medication administration or blood sampling, injection cap must be changed every 7 days. This is most common in the outpatient/home setting.

SUPPLIES

- Cap Change Kit - for single lumen (*PMM 19860*) or double lumen (*PMM 19862*)
- DualCap male/dark blue protector(s) (*PMM 69942*) - in outer pocket
- Site-Scrub(s) - in outer pocket
- Drape
- Mask
- Sterile Normal Saline syringe(s)
- Sterile gloves
- Antiseptic gel (for hand hygiene)
- Sterile 2x2 gauze
- Alcohol prep pads
- Injection cap(s)

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

- Pre-filled heparin (10 units/mL) syringe(s), per provider order, if needed
- DualCap needleless connector/light blue protector(s) (*PMM 69941*), if needed
- Site-Scrubs (*PMM 22154*), additional, if needed

PROCEDURE

1. Prepare for procedure:
 - a. Gather either single or double CVC Cap Change Kit and any additional supplies.
 - b. Clean work surface with hospital-approved disinfectant.
 - c. Perform hand hygiene.
2. Disconnect existing infusion. If planning to reconnect existing tubing after procedure:
 - a. Use alcohol prep pads to clean junction of tubing to injection cap. Scrub for 10 seconds and allow to dry for 10 seconds.
 - b. Disconnect tubing from injection cap, and aseptically attach passive disinfectant protector (dark blue DualCap) to end of tubing.
3. Perform hand hygiene.
4. Open cap change kit.
5. Remove foil cover from Site-Scrub and place with open end down onto outer portion of sterile field away from other supplies (See [Site-Scrub instructional video](#) – Appendix D).
6. Open drape and place under patient catheter.
7. Don mask and provide one to patient and everyone involved in procedure
8. Perform hand hygiene.
9. Don sterile gloves.
10. Prepare supplies:
 - a. Prime injection cap(s) with saline and place back on sterile field.
 - b. Open alcohol prep pads.
11. Prepare to remove injection cap from catheter hub.
 - a. Clamp catheter.
 - b. Remove injection cap from catheter hub. Do not touch open catheter hub or allow catheter hub to touch the patient's skin or any surface.
12. Place Site-Scrub device directly onto the open catheter hub. Press down on Site-Scrub device until it cannot be pushed any further.
13. Twist Site-Scrub 10 times, back-and-forth, for 10 seconds. Do not twist more vigorously than once/second to prevent foam dislodgement (however it is a manufacturer design for this to happen in order to prevent small fragments from coming loose). Remove device.
14. Allow to dry for 10 seconds.
15. Attach new primed injection cap and unclamp catheter.
16. To resume IV infusion:
 - a. Flush catheter with 1 to 10 mLs saline, drawing back to confirm patency as appropriate based on lumen size. Remove syringe.
 - b. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

- c. Remove passive disinfectant protector from tubing and discard.
 - d. Connect IV tubing. Proceed to Step 17.
17. To heparin flush-lock:
- a. Flush catheter with 1 to 10 mLs normal saline, remove syringe.
 - b. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
 - c. Attach heparin flush syringe to injection cap and flush using **positive pressure technique**. Remove syringe.
 - i. **Positive Pressure Technique** is a method used to maintain positive pressure within the catheter lumen when heparin flush-locking to prevent backflow of blood into catheter, and future clotting.
 - Flush CVC with 1-10 mL (per unit practice) of saline
 - Flush-lock CVC with heparin solution
 - Close the CVC slider/clip clamp while instilling the final 0.2 mL of heparin solution
 - Remove syringe only after clamping
 - d. Attach needleless passive disinfectant protector (i.e., light blue DualCap) to injection cap.
18. Remove gloves and perform hand hygiene.
19. Document cap change procedure in patient's medical record.

Blood Sampling

CRITICAL POINTS

1. Maintain these basic principles:
 - a. Minimize the number of catheter accesses during a single lab draw.
 - b. Utilize direct blood collection method (i.e., collect blood directly into vacutainer tubes via blood transfer device), whenever possible to avoid making multiple connections (e.g., removing a syringe and adding a new syringe) and to avoid additional blood transfer steps.
 - c. Establish excellent asepsis with single dedicated cleansing/scrub and dry of injection cap.
2. If you are drawing blood samples from CVC to obtain blood cultures, **STOP** and refer to [Blood Culture Methods \(General\)](#) Nursing Procedure. Whenever possible, limit routine blood sampling to once daily to decrease risk of infection from multiple catheter entries.
3. Injection cap must be changed when visible blood cannot be cleared from cap.
4. When drawing blood from multi-lumen catheters, obtain specimens from largest lumen. Largest lumen is usually red in tunneled catheters.
5. When possible, avoid use of 1.9 Fr or smaller lumens for blood sampling (e.g., red lumen of 2.6 Fr MedComp dual lumen PICC). These tiny lumens are prone to occlusion, and, in turn, infection.
 - a. When used for medication delivery or, rarely, blood sampling (e.g., DTTP culture), instill a turbulent flush after use and with every access to maintain patency.
 - b. Maintain unused lumen(s) as a continuous infusion as they are prone to occlusion.
6. Whenever possible, avoid blood sampling from CVC dedicated to TPN administration.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)**BLOOD SAMPLING METHODS**

Methods of blood sampling are described first in brief, followed by detailed procedures for each method.

For blood culture procedure, refer to [Blood Culture Methods \(General\)](#).

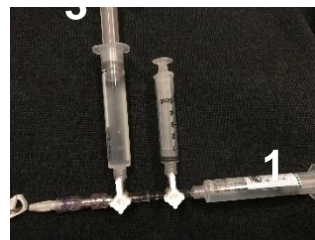
1. **Vacutainer Blood Transfer Device (Direct) Method:** Bonded double stopcock with vacutainer blood transfer device (blue/male) is attached directly to injection cap. Lab tubes are placed into blood transfer device to withdraw blood sample(s). For catheter lumens < 4 Fr and/or when needing a small volume sample, the same technique and equipment assembly as above can be used but with empty sample syringe in place of blood transfer device. Blood is aspirated into syringe, and then transferred to lab tubes using vacutainer blood transfer device (pink/female).
2. **Syringe (Indirect) Method:** This method can be used for troubleshooting a blood draw without the stopcock, if necessary, but the direct method described above is the primary, preferred method of lab draw.

VACUTAINER (DIRECT) METHOD FOR LABS**Supplies**

- Clean gloves
- Alcohol prep pads
- DualCap male/dark blue protector (*PMM 69942*), if needed
- 10 mL pre-filled normal saline syringes, two for each lumen
- Pre-filled heparin (10 units/mL) flush-lock syringe(s), per provider order, if needed.
- Lab tubes labeled with patient name and medical record number
- Vacutainer blood transfer device (blue/male), **or** empty sample syringe and vacutainer blood transfer device (pink/female) if following indirect method.
- Bonded double stopcock

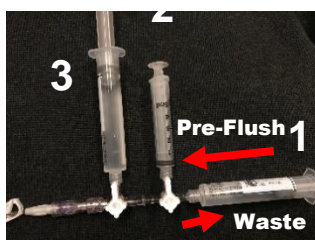
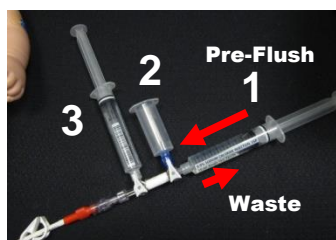
Procedure

1. Verify provider order for laboratory studies.
2. Gather supplies.
3. Use two patient identifiers to verify patient.
4. Clean work surface with hospital-approved disinfectant.
5. Perform hand hygiene and don clean gloves.
6. Open supplies and assemble stopcock device.
 - a. Attach flush syringes (see figures below with vacutainer transfer device in first and sample syringe in second) to first side port (3) and end port (1). Add blood transfer device or sample syringe to second side port (2).

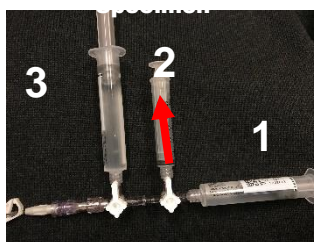
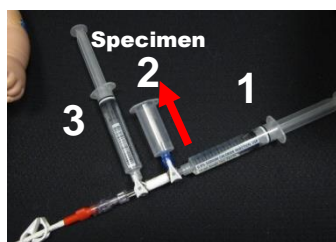


CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

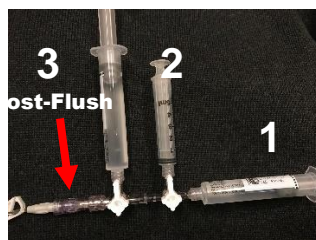
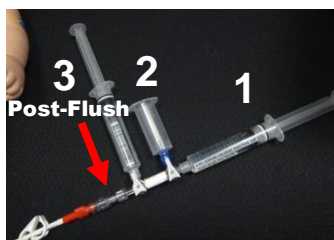
- b. Prime stopcock from most distal flush (1).
 - c. Place device aside.
7. If there are fluids infusing through catheter/lumen used for blood draw:
 - a. Stop infusion and clamp infusing lumens of catheter for at least one minute before blood draw. Never interrupt critical medication infusions.
 - b. Wrap alcohol prep pad around junction between IV tubing and injection cap and scrub for 10 seconds and allow to dry for 10 seconds.
 - c. Disconnect IV tubing and attach passive disinfectant protector (i.e., dark blue DualCap) to end of tubing.
8. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
9. Attach assembled stopcock device to injection cap.
10. Flush with 1 to 10 mLs normal saline, using push-pause technique (1). Using same syringe aspirate 2 mL of blood for discard. Turn stopcock off to flush/discard and do not remove syringe.



11. Complete specimen collection via blood transfer device or sample syringe by placing lab tube(s) into device to withdraw blood sample (2).



12. Flush catheter with 1 to 10 mLs of normal saline via proximal flush syringe (3). Do not remove syringe.



13. Remove stopcock device from catheter injection cap.
14. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

15. To resume continuous infusion: Remove and discard passive disinfectant protector (i.e., dark blue DualCap) from tubing, connect IV tubing to injection cap and restart IV infusion.
16. To heparin flush-lock catheter/lumens: Attach heparin flush syringe to injection cap and flush using positive pressure technique. Remove syringe and attach needleless passive disinfectant protector (i.e., light blue DualCap) to injection cap
17. If patient has multi-lumen catheter, heparin flush-lock each locked lumen.
18. Ensure all blood specimens are appropriately labeled and place in biohazard bag.
19. Remove gloves and perform hand hygiene.
20. Send specimens to lab.
21. Document procedure in patient's medical record.

SYRINGE (INDIRECT) METHOD FOR LABS

This method can be used for troubleshooting a blood draw without the stopcock, if necessary, but the direct method described above is the primary, preferred method of lab draw.

Supplies

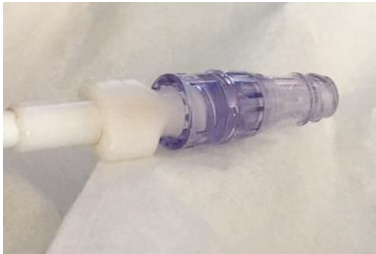
- Clean gloves
- Alcohol prep pads
- DualCap male/dark blue protector (*PMM 69942*), if needed
- 10 mL pre-filled normal saline syringe
- Lab tubes labeled with patient name and medical record number
- Empty sample syringe (size will vary based on catheter size)
- Vacutainer blood transfer device (pink/female)

Procedure

1. Verify provider order for laboratory studies.
2. Gather supplies.
3. Use two patient identifiers to verify patient.
4. Clean work surface with hospital-approved disinfectant.
5. Perform hand hygiene and don clean gloves.
6. Open supplies.
7. If there are fluids infusing through catheter/lumen used for blood draw:
 - a. Stop infusion and clamp infusing lumen(s) of catheter for at least one minute before blood draw. Never interrupt critical medication infusions.
 - b. Wrap alcohol prep pad around junction between IV tubing and injection cap and scrub for 10 seconds and allow to dry for 10 seconds.
 - c. Disconnect IV tubing and attach passive disinfectant protector (i.e., dark blue DualCap) to end of tubing.
8. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

9. Attach empty blood sample syringe to injection cap. (Figure O)

Figure N**Figure O**

10. Discard 1-2 mL (dependent on patient and catheter size) of blood.
11. Obtain blood sample.
12. Transfer blood sample into lab tube using pink/female vacutainer blood transfer device. Place lab tube into device to fill. (Figure P)

Figure P

13. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
14. Using the 10 mL normal saline syringe and push-pause technique, flush catheter with 1-10 mL of saline.
15. *If blood remains in cap after saline flush, cap must be changed. Refer to [cap change](#) section.
16. Remove normal saline syringe.
17. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
18. To resume continuous infusion, remove and discard passive disinfectant protector (i.e., dark blue DualCap) from tubing, reconnect IV tubing to injection cap and restart infusion.
19. Ensure all blood specimens are appropriately labeled and place in biohazard bag.
20. Remove gloves and perform hand hygiene.
21. Send specimens to lab.
22. Document procedure in the medical record.

Heparin Flush Lock**CRITICAL POINTS**

1. If any CVC, including implanted vascular access ports, must be accessed more than twice in 24 hours, it should be maintained as a continuous infusion and not be heparin flushed-locked in order to avoid multiple entries into catheter. Provider order is necessary for the continuous infusion.
2. Maintain unused lumen(s) of 2.6 Fr MedComp dual lumen PICC as a continuous infusion (i.e., do not heparin-lock) as they are prone to occlusion and, in turn, infection. If necessary to lock one lumen, select the larger, 1.9 Fr red lumen, and infuse via the smaller 0.7 Fr white lumen.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

3. CVCs should only be heparin flush-locked using prefilled heparin flush syringes. **Heparin vials should not be used for heparin flush-lock procedures.**
4. Groshong PICCs are maintained with 5 mL of 0.9% sodium chloride (*not* heparin) once weekly and after each use. These catheters can be identified by the Groshong label on the wings and blue color.
5. Heparin flush-lock all patients in BCH with a concentration of 10 units/mL, including all adult patients >18 years of age.
6. Refer to Large-Bore Vascular Access Catheter Care (General) (e.g., Hemodialysis / Apheresis) nursing procedure for information regarding flush-locking these catheters.

SUPPLIES

- Alcohol prep pads
- 10 mL pre-filled normal saline syringe(s)
- Pre-filled heparin (10 units/mL) flush-lock syringe(s) (per provider order)
- Needleless passive disinfectant protector (light blue DualCap) (*PMM 69941*)

PROCEDURE

1. Gather supplies.
2. Perform hand hygiene.
3. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
4. Attach pre-filled normal saline syringe and flush CVC with 1 to 10 mL of normal saline; remove and discard syringe.
5. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
6. Attach heparin flush syringe and flush catheter using positive pressure technique. Remove syringe and attach needleless passive disinfectant protector (i.e., light blue DualCap) to injection cap.
7. Repeat steps 3-6 as indicated for all capped CVC lumens in multi-lumen catheters.
8. Perform hand hygiene.
9. Document procedure in patient's medical record.

Accessing an Implanted Port

CRITICAL POINTS

1. Use aseptic technique to access port.
2. Port is accessed using a non-coring needle. A 20 gauge, $\frac{3}{4}$ or 1-inch needle are most commonly used. Port access needles are also available in 22 gauge and 1 $\frac{1}{4}$ inch length.
3. If patient has a power injectable port, a power injectable non-coring needle must be used in order to utilize the power injectable ability.
 - a. Power injectable port can be identified in a number of ways including palpation of shape and/or palpation bumps, presence of PowerPort discharge packet or availability of implant record sticker. The most reliable method is to view the insertion record/note (when available) and/or imaging for the radiopaque identifier to confirm power status.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

4. Change non-coring needle a minimum of every 7 days, and PRN if dressing becomes non-adherent to the point of exposing port needle. Change dressing whenever needle is changed and if dressing becomes non-occlusive, damp or soiled.
5. Verify correct needle placement by flushing port with 1-2 mL normal saline and aspirating blood after removing needle introducer. If unable to flush or aspirate blood, re-access port using new needle and new central line dressing kit.
6. Verify patency of port by flushing and aspirating for blood before administration of medications or IV fluids.
7. Monitor port site for infiltration. If needle becomes dislodged, re-access port immediately. Do not attempt to apply topical anesthetic to site before re-accessing as port may become clotted during the 30-minute wait time.
8. Port must be flushed with 10 mL normal saline followed by 50 units of heparin (5 mL of 10 unit/mL) before removing non-coring needle.
9. If port is accessed and not in use, flush daily with 10 mL normal saline and 50 units of heparin (5 mL of 10 units/mL) and attach needleless passive disinfectant protector (i.e., light blue DualCap) to injection cap
10. Port must be flushed with 10 mL normal saline and 50 units of heparin (5 mL of 10 units/mL) once a month when not accessed.
11. See [Port Access & Deaccess Part 1: Gripper Micro \(Non-Power Needle\) and Port Access & Deaccess Part 2: Power Gripper Plus \(Power Needle\) instructional videos](#) (Appendix D).

SUPPLIES

- Port access kit (*PMM 531246*)
 - Sterile drape
 - Gloves
 - Mask
 - Gauze 2x2
 - Sterile gloves
 - Chloraprep 3 mL applicator
 - 10 mL sterile pre-filled normal saline syringe
 - Microclave injection cap
 - Cavilon
 - Tegaderm 1685
 - Alcohol prep pad
 - Tape strip
- Port access needle (Gripper Micro or Gripper Plus Power)
- Pre-filled heparin (5 mL of 10 units/mL) flush-lock syringe(s), if needed
- Needleless passive disinfectant protector (light blue DualCap) (*PMM 69941*), if needed

PROCEDURE

1. Apply topical anesthetic to port site 30 – 60 min prior to procedure.
2. Gather supplies.
3. Explain procedure to patient and family.
4. Clean work surface with hospital approved disinfectant.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

5. Perform hand hygiene.
6. Open port access kit to outer tier.
7. Open drape and place under patient catheter.
8. Don clean gloves and mask. Provide mask to patient and anyone involved in port access.
9. Remove topical anesthetic with gauze. Remove gloves.
10. Perform hand hygiene.
11. Unfold kit to inner tier and add port access needle to sterile field.
12. Don sterile gloves.
13. Attach injection cap to needle and prime with normal saline solution. Place back onto sterile field.
14. Perform skin antisepsis with Chloraprep (unless contraindicated).
 - a. Use Chloraprep applicator to cleanse port site using a back and forth motion over the access site and an area slightly larger than the dressing will cover for a minimum of 30 seconds.
 - b. Allow site to completely dry. Do not blow, fan, or blot/wipe with gauze.
15. If Chlorhexidine is contraindicated, disinfect site with povidone-iodine swabsticks.
 - a. Remove any dried blood or exudate with alcohol.
 - b. Cleanse area with povidone-iodine using circular motion working out from center of port to include an area slightly larger than dressing will cover; repeat with each of three swabsticks.
 - c. Allow to completely dry for at least two minutes. Do not blow, fan or blot/wipe with gauze.
 - d. When dry, remove povidone-iodine with sterile saline wipes using the same circular motion.
 - e. Blot dry with gauze.
16. Palpate area of implanted port with non-dominant hand locating center of port septum. Stabilize port between thumb and first finger of non-dominant hand. Hold needle/introducer at widest part using thumb and middle finger. Place index finger over needle/introducer. Insert needle/introducer into port at a 90-degree angle using firm even pressure. You may push needle down an additional $\frac{1}{4}$ inch to compress foam pad.
17. Gripper Micro (Figure Q):
 - a. Pull tab on needle/introducer in towards self and lift safety arm up and arch back until needle clicks into the locked position. Discard in sharps receptacle. Blunt port cannula is now in place.

Figure Q

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

18. Gripper Plus Power (Figure R):
 - a. Do not lift safety arm as this will deaccess the needle.

Figure R

19. Flush port with 1-2 mL normal saline and aspirate for blood return to verify correct needle placement. Once correct needle placement has been established, flush catheter with 10 mL normal saline.
20. Apply Cavilon skin prep to an area slightly larger than where dressing will be applied. Allow to dry for 30 seconds. Save Cavilon prep wand in packaging for later use.
21. Apply transparent dressing over site using gentle pressure, securing from insertion site and outward to minimize tenting of dressing. Press dressing border with fingers while removing paper backing.
22. Apply reserved Cavilon to edge of dressing border where it meets the skin to help seal the dressing to skin. Use tape strips to secure stress loop outside dressing.
23. Scrub injection cap for 10 seconds and allow to dry for 10 seconds.
24. Attach primed IV tubing and begin infusion or heparin-lock the port and attach needleless passive disinfectant protector (i.e., light blue DualCap) to injection cap.
25. Remove gloves and perform hand hygiene.
26. Document port access procedure, including needle gauge and size, in patient's medical record.

De-accessing an Implanted Point

See [Port Access & Deaccess Part 1: Gripper Micro \(Non-Power Needle\)](#) and [Port Access & Deaccess Part 2: Power Gripper Plus \(Power Needle\) instructional videos](#) (Appendix D).

SUPPLIES

- Clean gloves
- 10 mL pre-filled normal saline syringe
- Pre-filled heparin (5 mL of 10 units/mL) flush-lock syringe(s)
- Alcohol prep pad
- Adhesive bandage

PROCEDURE

1. Gather supplies.
2. Explain procedure to patient and family.
3. Clean work surface with hospital-approved disinfectant.
4. Perform hand hygiene.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

5. Open supplies.
6. Don clean gloves.
7. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
8. Attach normal saline syringe and flush catheter. Remove syringe.
9. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
10. Attach heparin flush syringe and flush-lock with 50 units of heparin flush solution (5 mL of 10 unit/mL) using positive pressure technique. Remove syringe.
11. Loosen dressing around port needle.
12. Stabilize port by pressing down on the edge of port with two fingers of non-dominant hand.
13. Gripper Micro: Lift blunt cannula straight out of port at 90 degrees with dominant hand. Discard in sharps receptacle.
14. Gripper Plus Power: Arch needle/introducer up and back until needle clicks into the locked position. Discard in sharps receptacle.
15. Cover site with adhesive bandage, if needed.
16. Remove gloves and perform hand hygiene.
17. Document procedure.

Repair of Tunneled Catheter

CRITICAL POINTS

1. If a hole, leak or break is noted in catheter, immediately clamp catheter proximal to damaged portion with blue plastic clamp or existing catheter clamp. Notify provider. Catheter must remain clamped during repair procedure.
2. Determine if damaged catheter is repairable. Note: Power injectable catheters are *not* repairable.
3. Catheter repair procedure should be performed immediately by a RN who has demonstrated competency or a provider trained in the procedure.
4. If break takes place proximal to the bifurcation of a double lumen catheter, repair the complete external catheter body, if there is at least 5 cm of undamaged catheter remaining external to skin exit site/proximal to rupture.
5. If only one lumen of a double lumen catheter is damaged, repair only the damaged leg (i.e., red or white lumen), if at least 2.5 cm of undamaged catheter exists distal to bifurcation.
 - a. When repairing a single leg, note that repair kits are not labeled by size, but by color (i.e., red or white) only.
 - b. Second undamaged lumen of a double lumen catheter can continue to infuse fluids and/or medication during repair of damaged lumen. If leg repair is not possible due to proximity of the break to the bifurcation (e.g., less than 2.5 cm), repair entire catheter body.
6. Do not repair a ruptured line or lumen distal to a previous repair.
7. See [Broviac Repair instructional video](#) (Appendix D).

SUPPLIES

- Sterile powder-free gloves
- Sterile catheter repair kit (size specific for catheter); complete external catheter or single leg (i.e., red or white)
 - On double lumen catheters, Fr size is marked at area of bifurcation on catheter.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

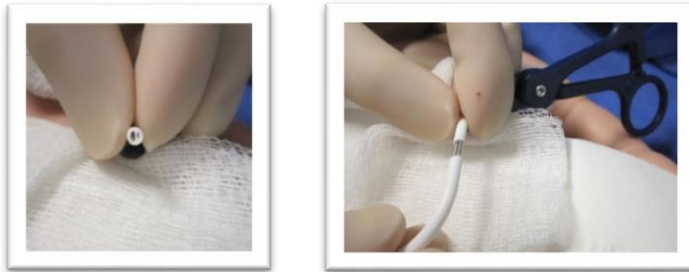
- On single lumen catheters, only lumen mm size is marked on catheter lumen. Refer to [Table 2 Catheter Size Chart](#) below to determine Fr size of catheter using lumen mm size.
- Cap change kit; single or double
- Needleless passive disinfectant protector (light blue DualCap) (*PMM 69941*)
- Blue plastic clamp
- Sterile scissors (sharp, fine tip) – (*PMM 12703*)
- Pre-filled heparin (10 units/mL) flush-lock syringe(s), per provider order
- Tongue blade (4 -5 cm segment padded with gauze)
- Sterile 4x4 gauze
- Tape

PROCEDURE

1. Gather supplies.
2. Explain procedure to patient and family.
3. Clean work surface with hospital-approved disinfectant.
4. Perform hand hygiene.
5. Don mask.
6. Place mask on patient and provide one to anyone involved in repair procedure.
7. Perform hand hygiene.
8. Open supplies including catheter repair kit, cap change kit, sterile scissors, and sterile 4x4s, and empty onto sterile field. Place heparin flush syringe next to sterile field.
9. Place sterile drape underneath catheter.
10. Don sterile gloves.
11. Attach and prime injection cap(s) to catheter repair segment. Place back onto sterile field. Repeat for double lumen catheter.
12. Remove plunger from syringe barrel and fill barrel with medical adhesive. Insert plunger and attach blunt needle to end of syringe. Place syringe back onto sterile field.
13. Hold catheter proximal to damaged area with a sterile 4x4 gauze. Scrub approximately 2 inches above and below damaged catheter site with alcohol prep pad for 10 seconds and allow to dry for 10 seconds.
14. Place cleaned catheter segment on a sterile 4x4 and place on sterile drape.
15. Ensure catheter is clamped at least 5 cm proximal to damaged area if repairing entire catheter body, and at least 2.5 cm if repairing single catheter leg.
16. Using sterile scissors cut external portion of damaged catheter at a 90-degree angle directly proximal to damaged area. Remove damaged portion of catheter from sterile field. Ensure cut end of existing catheter remains sterile.
17. Gently squeeze cut end of catheter to expel any residual fluid to allow space for stent. Dry with gauze.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

18. Insert metal stents of replacement catheter segment into the corresponding small and large lumens until end of replacement catheter is 3 mm from cut end of catheter (Figure S).

Figure S

19. Dry space between catheter ends with sterile 4x4 gauze. Fill the 3mm space with small amount of adhesive and push new segment tightly into cut end of catheter. Ensure catheter ends are well-approximated and no or minimal visible space remains at repair joint. Hold together for approximately one minute to allow adhesive to set.
20. Apply adhesive onto outside of catheter around repair joint. Inject small amount of adhesive under splice sleeve to lubricate before sliding sleeve over repair joint, then slide splice sleeve down and center it over repair joint.
21. Inject adhesive underneath each end of splice sleeve and roll splice sleeve between fingers to distribute adhesive. Wipe off excess adhesive from outside of catheter with gauze.
22. Unclamp catheter and check for blood return. After blood return confirmed, gently flush catheter with 10 mL normal saline. Remove syringe.
23. Scrub injection cap with alcohol for 10 seconds and allow to dry for 10 seconds.
24. Attach heparin flush syringe and flush with 2 mL heparin flush solution (10 units/mL), using positive pressure technique. Attach needleless passive disinfectant protector (i.e., light blue DualCap) to injection cap.
25. Repeat heparin flush-lock for double lumen catheter.
26. Cut tongue blade and wrap with gauze and tape.
27. Place repaired joint of catheter lengthwise along surface of padded tongue blade splint and secure with tape on either side of splint, ensuring visualization of repair. Leave splint on catheter repair joint for 48 hours.
 - a. Catheter may be used 4 hours post repair. Attempting use before this time may cause catheter repair joint to split apart. If patient requires immediate IV access, placement of a peripheral IV is necessary.
28. Perform dressing change on catheter site, if original dressing was removed during repair procedure.
29. Remove gloves and perform hand hygiene.
30. Document repair procedure. File incident report for broken or damaged catheter.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

***Table 2: Catheter Size Chart for Broviac, Hickman and Leonard CVCs**

Catheter Description/Size	Volume	Exterior diameter/ Interior diameter	
Broviac 2.7 Fr.	0.15 mL	0.9/0.5 mm	
Broviac 4.2 Fr.	0.3 mL	1.4/0.7 mm	
Broviac 6.6 Fr.	0.7 mL	2.2/1.0 mm	
Hickman 7.0 Fr.	White 0.6 mL	2.3	0.8 mm
	Red 0.8 mL		1.0 mm
Hickman 9.0 Fr.	White 0.6 mL	3.0	0.7 mm
	Red 1.3 mL		1.3 mm
Leonard 10.0 Fr.	White 1.3 mL	3.3	1.3 mm
	Red 1.3 mL		1.3 mm

Non-Tunneled Catheter Removal

CRITICAL POINTS

1. RN CVC removal:
 - a. Critical Care RNs may remove a PICC.
 - b. Cardiac Transitional Care nurses, Vascular Access nurses, the ambulatory procedure nurse and hematology/oncology and BMT NPs may also remove PICCs.
 - c. PICU and PCICU RNs who have completed the CVC removal CBO may additionally remove a non-tunneled CVC (excluding all HD and transthoracic intracardiac catheters).
 - d. Cardiac Intensive Care RNs who have demonstrated competency may remove Multi-Lumen Infusion Catheters (MLIC) from introducer catheters, and introducer catheters themselves.
2. Trained providers may remove CVC's without supervision.
 - a. Only physicians may remove tunneled CVCs such as Broviacs/Hickmans, implanted vascular access ports, and large bore (dialysis) catheters. Only the pediatric cardiothoracic surgery team can remove transthoracic intracardiac catheters.
 - b. If a provider is performing a non-tunneled (non-PICC) catheter removal, an RN is present to assist.
3. Ensure IV access (e.g., PIV) is in place prior to non-tunneled catheter removal.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)**PICC REMOVAL**

- **NOTE:** For any catheter placed directly into the neck (internal jugular vein) or the groin (femoral vein) regardless of the catheter type, refer [Non-Tunneled Catheter Removal](#).

SUPPLIES

- Clean gloves
- Sterile gauze x 2
- Petroleum-based ointment, sterile (e.g., antibiotic ointment)
- Transparent dressing
- Adhesive remover

PROCEDURE

1. Ensure provider order for PICC removal. .
2. Consult with a Child Life specialist for procedural support, if needed.
3. Explain procedure to patient/family.
4. Turn off infusions or move infusions to alternate access
5. Gather supplies.
6. Clean work surface with hospital-approved surface disinfectant.
7. Position patient supine with catheter exit site at or below level of heart.
8. Perform hand hygiene.
9. Don clean gloves.
10. Remove existing dressing.
11. Remove stabilization device.
12. Apply sterile petroleum-based ointment to sterile gauze. The ointment will assist to seal the skin-to-vein tract and decrease risk of air embolus.
13. Hold sterile gauze with ointment over catheter site in preparation for catheter removal.
14. Slowly remove PICC using gentle, even traction while simultaneously holding sterile gauze with ointment over site. If resistance is met:
 - a. Discontinue removal and aseptically secure catheter.
 - b. Apply warm compress proximal to catheter exit site and allow time for vasospasm to resolve before attempting again.
 - c. Notify provider if still unsuccessful.
15. Apply pressure to exit site with sterile gauze and ointment for a minimum of two minutes, and until bleeding stops. **DO NOT REMOVE GAUZE.** If gauze becomes saturated, apply more over initial gauze, with pressure, until bleeding ceases.
16. Apply transparent, occlusive dressing over gauze and ointment.
17. Have patient remain in removal position for 30 minutes post procedure.
18. Maintain occlusive dressing and change every 24 hours until exit site is healed.
19. Inspect and document catheter for integrity, and compare catheter length to original insertion length to ensure entire catheter was removed. Immediately notify provider of discrepancy.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

20. Remove gloves and dispose of soiled supplies.
21. Document PICC removal procedure including ease of procedure, patient tolerance, integrity of catheter, and catheter length. Remove PICC LDA from medical record.

NON-TUNNELED CATHETER REMOVAL

- **NOTE:** This **excludes** HD and transthoracic intracardiac catheters. Only CICU RNs who have demonstrated competency may remove Multi-Lumen Infusion Catheters (MLIC) from an introducer catheter, and introducer catheters themselves. MLIC and introducer catheters may be removed simultaneously, or a MLIC removed alone with the introducer catheter remaining in place.

SUPPLIES

- Clean gloves
- Sterile gauze x 2
- Petroleum-based ointment, sterile (e.g., antibiotic ointment)
- Transparent dressing
- Suture removal kit (if needed)
- Adhesive remover

PROCEDURE

1. Review provider order for catheter removal.
2. Consult with a Child Life specialist for procedural support, if needed.
3. Assess coagulation lab values (i.e., platelets, PT, PTT, INR) if ordered in the past 24 hours or if there is a provider order prior to catheter removal. If patient is receiving any medications that affect coagulation (e.g., heparin, enoxaparin, coumadin, defibrotide), discuss with provider prior to catheter removal as increased time may be needed for stasis to occur.
4. Explain procedure to patient/family.
5. Turn off infusions or move infusions to alternate catheter. Clamp all catheter lumens.
6. Gather supplies.
7. Clean work surface with hospital-approved surface disinfectant.
8. Perform hand hygiene.
9. Position patient: **DO NOT ATTEMPT CATHETER REMOVAL WITH PATIENT IN SITTING POSITION.**
 - a. **Femoral CVC:** Position patient supine with head of bed flat to 30 degrees and catheterized limb straight.
 - b. **Jugular or subclavian (thoracic) CVC:** Position patient supine in Trendelenburg position (feet elevated), or with head of bed flat when Trendelenburg position is contraindicated.
10. Perform hand hygiene.
11. Don clean gloves.
12. Remove existing dressing.
13. Remove existing sutures, if present.
14. Apply petroleum-based ointment to sterile gauze.
15. Hold sterile gauze with ointment over catheter site in preparation for catheter removal.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (continued)

16. Perform catheter removal:
 - a. **For patients able to follow instructions:**
 - i. Have patient take a deep breath, exhale and hold breath half way through exhalation.
 - ii. Slowly remove catheter using gentle, even traction while simultaneously applying sterile gauze with ointment over the site.
 - b. **For patients unable to follow instructions:**
 - i. Monitor respiratory cycle and remove catheter during exhalation phase. Use gentle, even traction while simultaneously applying sterile gauze with ointment over the site.
17. If resistance is met, discontinue removal, aseptically secure catheter, and notify provider.
18. Apply pressure to exit site with sterile gauze and ointment for a minimum of two to five minutes, and until bleeding stops. **DO NOT REMOVE GAUZE.** If gauze becomes saturated, apply more over initial gauze, with pressure, until bleeding ceases.
19. Apply transparent, occlusive dressing over gauze and ointment.
20. Notify provider immediately for signs or symptoms of air embolism:
 - a. Neurologic changes including change in level of consciousness.
 - b. Cardiovascular changes including arrhythmias, tachycardia, hypotension, decreased pulses, and prolonged capillary fill time.
 - c. Respiratory distress including tachypnea, decreased oxygen saturation, and increased work of breathing.
21. Inspect catheter integrity upon removal. Notify provider if catheter fracture is suspected.
22. Document procedure including ease of procedure, patient tolerance, and catheter integrity.
23. Maintain patient on bed rest for a minimum of 60 minutes following catheter removal.
24. Inspect dressing 15 min, and again one hour post catheter removal for bleeding or swelling. If present, apply pressure and notify provider.
25. Maintain occlusive dressing for 48 hours and then change daily until exit site is healed.

MLIC REMOVAL ONLY (INTRODUCER CATHETER REMAINS IN PLACE)**SUPPLIES**

- Clean gloves
- Sterile gloves
- Alcohol wipe
- Hemostasis Valve Obturator (Obturator Cap) – (*PMM 45317*)

PROCEDURE

1. Review provider order for MLIC removal.
2. Explain procedure to patient/family.
3. Turn off infusions or move infusions to alternate catheter. Clamp all catheter lumens.
4. Gather supplies.
5. Clean work surface with hospital-approved surface disinfectant.
6. Perform hand hygiene.
7. Position patient: **DO NOT ATTEMPT CATHETER REMOVAL WITH PATIENT IN SITTING POSITION.**

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

- a. **Femoral CVC:** Position patient supine with head of bed flat to 30 degrees and catheterized limb straight.
 - b. **Jugular or subclavian (thoracic) CVC:** Position patient supine in Trendelenburg position (feet elevated), or with head of bed flat when Trendelenburg position is contraindicated.
8. Perform hand hygiene.
 9. Don clean gloves.
 10. Unlock MLIC from introducer catheters.
 11. Perform MLIC removal:
 - a. **For patients able to follow instructions:**
 - i. Have patient take a deep breath, exhale and hold breath half way through exhalation.
 - ii. Slowly remove catheter using gentle, even traction while simultaneously applying sterile gauze with ointment over the site.
 - b. **For patients unable to follow instructions:**
 - i. Monitor respiratory cycle and remove catheter during exhalation phase.
 12. If resistance is met, discontinue removal, aseptically secure catheter, and notify provider.
 13. Inspect catheter integrity upon removal. Notify provider if catheter fracture is suspected.
 14. Dispose of MLIC.
 15. Remove gloves and perform hand hygiene.
 16. Open obturator cap package and alcohol wipe.
 17. Clean introducer catheter hemostasis valve – scrub for 10 seconds and allow to dry for 10 seconds.
 18. Insert obturator cap into hemostasis valve and twist to lock in place.
 19. Document procedure including ease, patient tolerance, and catheter integrity. Remove MLIC LDA from medical record.

Troubleshooting

Problem	Suspected Issue	Action
Skin irritation under dressing site	<ul style="list-style-type: none"> • Skin cleanser (e.g., CHG) not permitted to dry fully prior to dressing application • Sensitivity/allergy to cleanser, skin barrier or dressing 	<ul style="list-style-type: none"> • If skin irritation and/or redness noted upon removal of Tegaderm dressing, consider use of IV3000 (aka Opsite), IV Clear silicone, or other transparent dressing. • Notify CNS/APN to help follow.
Contamination of dressing, catheter lumen, injection cap or tubing	<ul style="list-style-type: none"> • Proximity of CVC exit site/dressing, catheter lumen(s), injection cap or tubing to sources of secretions, emesis, wound discharge, urine or stool 	<ul style="list-style-type: none"> • Dressing soiled with stool, urine, emesis, or secretions: <ul style="list-style-type: none"> ▪ Interventions: ▪ Clean off visible debris from dressing and surrounding area with dry or saline wipes, followed by CHG. ▪ Change CVC dressing immediately. ▪ Notify provider, document and communicate contamination event.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

Problem	Suspected Issue	Action
		<p>Prevention:</p> <ul style="list-style-type: none"> ▪ Apply protective covering (e.g., Steri-Drape) over dressing. <ul style="list-style-type: none"> • CVC lumen, cap, or tubing soiled with stool, urine, emesis, or secretions: <p>Interventions:</p> <ul style="list-style-type: none"> ▪ Clean off visible debris from CVC lumen, cap and/or tubing with dry or saline wipes, followed by CHG. ▪ Hold off on medication and fluid administration until contamination clean-up is complete. ▪ Change cap, extension set (e.g., bi or trifuse) and tubing as soon as possible. For patients on TPN, change IV tubing, minimally. ▪ Notify provider, document and communicate contamination event. <p>Prevention:</p> <ul style="list-style-type: none"> ▪ Route CVC catheter lumens/tubing away from potential sources of contamination using GripLok. ▪ Wrap injection cap/tubing connections at risk for contamination with Parafilm (See Appendix C and Parafilm application instructional video – Appendix D).
<p>Occluded catheter</p> <p>Related procedure: Alteplase Use for Central Venous Hemodialysis-Apheresis Catheters (Neonatal/Pediatric)</p>	<ul style="list-style-type: none"> • Biofilm/fibrin buildup within catheter lumen, narrowing and/or occluding lumen • Inadequate flushing of lumen or infusion rate to maintain patency • Drug precipitate as a result of infusion of incompatible solutions. Note that alteplase will not be effective in relieving occlusion • Mechanical obstruction due to external or internal kink or twisting of catheter • Internal migration of catheter 	<ul style="list-style-type: none"> • Rule out mechanical obstruction of catheter or extension tubing. • Attempt to flush catheter with 10 mL pre-filled normal saline syringe. Do not use force when flushing catheter. • For partial occlusion: If able to flush catheter but unable to aspirate blood or blood return is very sluggish, attempt to re-position patient or have patient take deep breath. If unsuccessful, discuss with provider and consider use of Alteplase. • For complete catheter occlusion: If unable to flush or aspirate blood, discuss with provider and consider use of Alteplase. • For port occlusion: Attempt re-accessing port with new needle, discuss with provider and consider use of Alteplase. • Provider may order dye study if unable to clear catheter occlusion to evaluate for mechanical source.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

Problem	Suspected Issue	Action
Broken or leaking catheter	<ul style="list-style-type: none"> Inadequate securement of catheter (esp at areas of vulnerability) Twisting or stretching of silicone (non-power) tunneled catheter lumen Use of non-approved devices to clamp catheter lumen 	<ul style="list-style-type: none"> Immediately clamp catheter proximal to the damaged portion with blue plastic clamp. For leaking or broken PICC line, clamp and notify PICC nurse or NP. Attempt to flush damaged catheter with heparin solution before performing repair. Catheter repair can be performed on silicone (non-power), tunneled Broviac, Leonard, or Hickman catheters. This procedure is performed by RNs or providers who have demonstrated competency in catheter repair. Pediatric Hematology/Oncology/BMT RNs or a member of VAST should be contacted for support. See Section XI. Repair of Tunneled Catheter.
Port needle infiltration	<ul style="list-style-type: none"> Inappropriately long needle Inadequate securement of needle/non-adherent dressing 	<ul style="list-style-type: none"> If port needle is dislodged and the site is swollen, stop the IV infusion immediately and re-access the port if infiltrated solution was not a vesicant, and edema is minimal. Heparin flush-lock the port, and allow the area of infiltrate to resolve. If IV access is required, consider placement of peripheral IV.

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

References

Level of Evidence (FAME*)	Level*	Reference
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* FAME Scale details: See nursing policy [Policy, Procedure, & Competency Development, Review, & Approval](#)





CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

Procedure History



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Reviewed / Revised:	9/07, 4/08, 7/09, 10/11, 1/14 4/16: Lisa Tsang, RN, MN; Lana King, RN, MS; Colleen Lue, RN; Kathy Ho, RN; Mai Ta, RN; Mary Kay Stratigos, RN; Barbette Murphy, RN, MS, PNP; Lori Fineman, RN, MS, CNS; Approved by the Patient Care Standards Committee 8/17: Lisa Tsang, RN, MN; Marykay Stratigos, RN; Kathy Ho, RN; Lana King, RN; Sue Peloquin, RN, MS, PNP 9/17: (Sections IV & XI) Lisa Tsang, RN, MN 2/18: Lisa Tsang, RN, MN; Kathy Ho, RN 10/19: Lisa Tsang, RN, CNS; Lori Fineman, RN, CNS; Jeannie Chan, RN, CNS 2/21: Lisa Tsang, RN, CNS; Lori Fineman, RN, CNS; Jeannie Chan, RN, CNS; Elizabeth Papp, RN, CNS; Kathy Ho, RN 3/22: Mary Nottingham, MSN, RN, Jeannie Chan, RN, CNS

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)


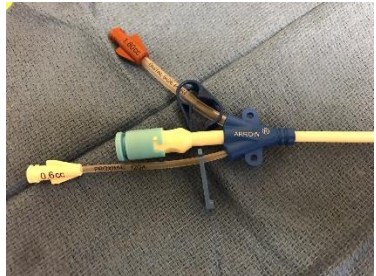

Appendix A: CATHETER DESCRIPTIONS

Catheter Type	Description	Image
<p>Non-tunneled, Non-cuffed (e.g., IJ, Femoral) (Arrow, Cook)</p>	<p>Percutaneously inserted central catheters: These short-term CVCs are not secured internally by a cuff or through tunneling. Non-tunneled, non-cuffed catheters are percutaneously placed in the subclavian, jugular and femoral veins. The tip of the catheter should ideally lie in the distal third of the superior vena cava (SVC), inferior vena cava (IVC) or at the caval-atrial junction.</p> <p>See Non-Tunneled CVC Dressing Securement Video</p>	
<p>Tunneled, Cuffed (non-power, silicone) (Hickman, Broviac, Leonard)</p>	<p>Central catheters provide stable long-term access. Surgeons in the Operating Room place these lines. During placement, with the distal end positioned in the right subclavian, the proximal end of the catheter is tunneled subcutaneously to the desired exit site. A cuff attached to the catheter is positioned in the tunnel that will eventually secure the catheter through tissue ingrowth and create a physical barrier to help reduce the risk of infection. A second anti-microbial cuff offers additional protection.</p>	
<p>Implanted Vascular Access Port (Bard, Vortex Port, Celsite, Infusaport, P.A.S. port)</p>	<p>A port is a hidden implantable venous access system for those patients requiring infrequent but long-term access. Ports are surgically placed and removed in the O.R. under anesthesia. The port is a metal or plastic device with a diaphragm containing an injection reservoir, self-sealing septum and an attached delivery catheter. It is designed for repeated entry to the vascular system or peritoneal cavity. Port access is performed only with a non-coring (e.g., Huber) needle.</p>	
<p>Large-Bore - Hemodialysis/Apheresis (VasCath, HemCath, Quinton, MedComp)</p>	<p>These are large-bore (7 to 11.5 Fr) dual-lumen silicone catheters placed in the internal jugular, subclavian, or femoral vein. Temporary dialysis catheters are not tunneled and are typically used for 6 weeks or less. The permanent catheters are cuffed and tunneled. The use of large-bore catheters is restricted to dialysis personnel and trained RNs who are also responsible for the catheter care and maintenance for dialysis, apheresis or CRRT.</p>	

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

<p>Peripherally Inserted Central venous Catheter (PICC) (Bard, MedComp, Argon, Cook Medical, Groshong)</p>	<p>A peripherally inserted central venous catheter (PICC) is inserted percutaneously into a peripheral vein (e.g., basilic, cephalic, saphenous, or brachial vein) and threaded so the catheter tip is located in a central vein.</p> <p>Groshong catheters incorporate a unique valve at the distal tip that allows for fluid infusion and blood aspiration, but when not in use, restricts blood backflow and air embolism by remaining closed. They are maintained with a 5 mL flush of saline once weekly and after each use.</p> <p>NOTE: PICC type catheters that are placed directly into a central vein (e.g., femoral or internal jugular vein) are NOT considered PICC catheters and should be referred to as non-tunneled catheters.</p>	
<p>Power Injectable Vascular Access (PowerPICC, PowerLine, PowerPort)</p>	<p>“Power” permits the injection of contrast media at a higher rate through a power injection machine versus the alternative hand injection or peripheral needle stick. This allows for more precise timing of delivery of and a more concise bolus of contrast medium. Useful when delivering contrast for radiological exams.</p> <p>Types of Power Injectable Central Venous Catheters: Bard Power Ports, Power PICCs (Purple PICCs), Power Lines (Purple Broviac/Hickman catheters) and Cook Medical Antimicrobial PICCs (orange in color)</p> <p>Power Injectable ports must be accessed by Power Injectable needles in order to sustain a power injection of contrast.</p>	

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

<p>Introducer Catheter</p>	<p>A large bore catheter with one or two side port lumens and a hemostasis valve (introducer lumen). The introducer lumen is used to place a double or triple lumen MLIC, pulmonary artery catheter or pacemaker catheter. When there is no catheter in the introducer lumen, an obturator cap must be in place (excludes Cordis Sheath Introducers, CSI). The side ports of introducer catheters can be used to administer medications that require central venous administration and large volume fluid or blood administration. Due to the large bore lumens and the hemostasis valve, these catheters may have increased risk for air embolus and blood loss. Introducer catheters are only used in the OR, cardiac catheterization lab and ICUs. CICU RNs trained to remove introducer catheters may remove them in the CICU.</p>	<p>Arrow PSI Introducer Catheter</p>  <p>Arrow MAC Introducer Catheter with obturator cap</p> 
<p>Multi-Lumen Infusion Catheter (MLIC)</p>	<p>A double lumen or triple lumen CVC placed through the hemostasis valve of an introducer catheter and locked in place. The MLIC can be used to transduce CVP (distal port) and/or infuse medications that require central venous administration. MLIC catheters are specific to the brand of introducer catheter, typically Arrow MAC or PSI compatible. If a MLIC is removed and the introducer catheter remains in place, an obturator cap must be placed into the hemostasis valve of the introducer catheter.</p>	<p>Introducer Catheter with MLIC</p> 

Appendix B: PEDIATRIC CENTRAL VENOUS CATHETER CARE & MAINTENANCE TABLE

Note: Always use push-pause technique when flushing catheters with saline. When heparin flush-locking catheter, use positive pressure technique.

Device Type	Description	Flush-Lock Procedure INPATIENT and OUTPATIENT	Blood Sampling	Frequency of Dressing Change
Non-tunneled Central Venous Catheters (e.g. Arrow single or multiple-lumen catheters, Percutaneous Sheath Introducer)	A percutaneous catheter placed in jugular, subclavian or femoral veins for short-term use.	PEDS: 1 to 10 mL NS, then lock with heparin (10 units/mL) 20 units (2 mL) per lumen IV daily if not infusing ICN Inpatient: Lock with heparin (10 units/mL) 10 units (1 mL) per lumen IV daily, if not infusing	Peds: Pre-flush with 1-10 mL NS ICN: Pre-flush with 1 mL Peds: Discard 2 mL blood ICN: Discard 1 mL blood Draw blood sample Post-flush with 1-10mL	Q7 days with Biopatch or if transparent dressing only. Q2 days if gauze used. Change if soiled, loose or wet.
Tunneled Catheters (Broviac, Hickman, Leonard)	Silicone catheter tunneled subcutaneously from insertion site to exit site on chest, back or sometimes abdomen.	PEDS: 1 to 10 mL NS, then lock with heparin (10 unit/mL) 20 units (2 mL) per lumen IV daily, if not infusing ICN Inpatient: Lock with heparin (10 unit/mL) 10 units (1 mL) per lumen IV daily if not infusing	Peds: Pre-flush with 1-10 mL NS ICN: Pre-flush with 1 mL Peds: Discard 2 mL blood ICN: Discard 1 mL blood	Q7 days with Biopatch or if transparent dressing only. Q2 days if gauze used. • Change if soiled, loose or wet.
Groshong Tunneled Catheter	Has a 3-way valve eliminating the need for heparin flush-lock.	Groshong: Routine flush is 5 mL of NS Q7 days. Do not use heparin.	Draw blood sample Post-flush with 1-10 mL	

CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

Device Type	Description	Flush-Lock Procedure INPATIENT and OUTPATIENT	Blood Sampling	Frequency of Dressing Change
Implanted Vascular Access Ports	The vascular access port consists of two parts: a catheter with the tip in the SVC and a self-sealing port placed in a subcutaneous pocket.	ACCESSED (needle in place, not infusing) Flush with 10 mL NS, then lock with heparin (10 unit/mL) 50 units (5 mL) IV daily DEACCESSED: Flush with 10 mL NS, then lock with heparin (10 units/mL) 50 units (5 mL) IV monthly	Pre-flush with 1-10 mL NS Discard 2 mL blood Draw blood sample Post-flush with 1-10 mL	<ul style="list-style-type: none"> • Q7 days with the needle change. • Change if soiled, loose or wet.
Peripherally Inserted Central Venous Catheters (PICC)	A silicone or polyurethane catheter inserted in a peripheral location (arms, hands, legs and occasionally the neck) with the tip located in the SVC or IVC Groshong PICC catheter has a valve that eliminates the need for heparin flush-lock.	PEDS: Flush with 1 to 10 mL NS, then lock with heparin (10 units/mL) 20 units (2 mL) per lumen IV daily if not infusing ICN Inpatient: Lock with heparin (10 units/mL) 10 units (1 mL) per lumen IV daily, if not infusing Groshong PICC: Routine flush is with 5 mL of NS Q7 days. Do not use heparin.	2 Fr or smaller not recommended. Peds: Pre-flush with 1-10 mL NS ICN: Pre-flush with 1 mL Peds: Discard 2 mL blood ICN: Discard 1 mL blood Draw blood sample Post-flush with 1-10 mL	<ul style="list-style-type: none"> • Q7 days with Biopatch • PRN if transparent dressing only. • Q2 days if gauze used. • Change if soiled, loose or wet
Midline (extended peripheral)	An “extended peripheral” with the tip no further than the proximal portion of the extremity. This is not a central venous catheter.	<ul style="list-style-type: none"> • Varies by manufacturer. Consult CNS. 	<ul style="list-style-type: none"> • Varies by manufacturer. Consult CNS. 	<ul style="list-style-type: none"> • Varies by manufacturer. Consult CNS.

Appendix C: USE OF PARAFILM FOR CONTAMINATION PREVENTION

Parafilm is a semi-transparent thermo-plastic film. It is water resistant, moldable, and self-sealing. It can be used as a protective barrier around the hub/junctions of a CVC to prevent contamination. It is NOT appropriate for or effective in securing connections. (See [Parafilm Application video](#))

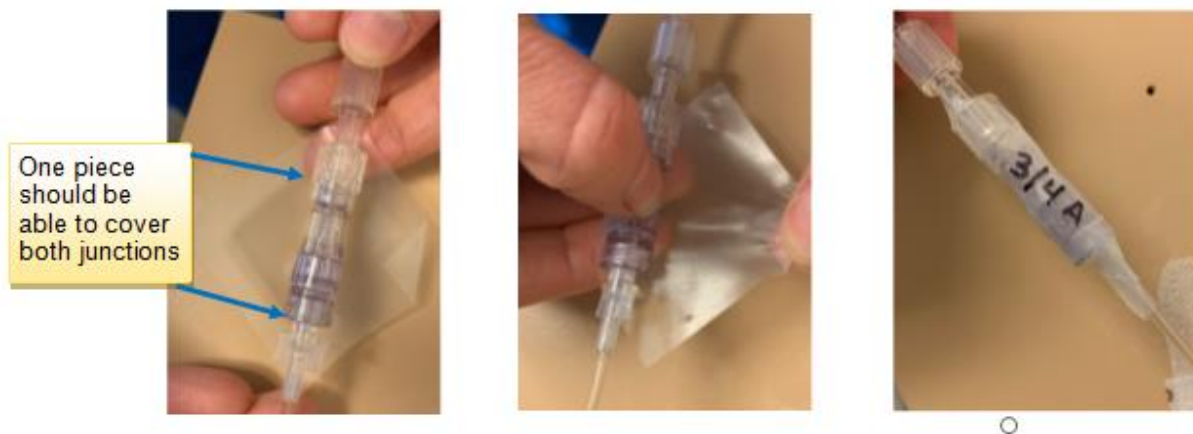
Consider use of Parafilm for the following:

- Patients experiencing frequent emesis or secretions
- Patients with loose or frequent stools
- Patients with an ostomy, gastrostomy tube, wound, etc. in close proximity to the CVC

Consult a CNS/APN or CVC champion or resource RN for recommendations.

Instructions for using Parafilm:

- Cut square sections of Parafilm following the outline on backing.
- Alcohol wipe the junction that will be covered (10 sec scrub, 10 sec dry).
- Apply pre-cut section of Parafilm around the hub/tubing junction that is closest to the patient. Stretch the Parafilm and it will stick to itself.
- Fold a tab at the end of the Parafilm for easier removal.
- Date the Parafilm near the tab with a Sharpie marker. Indicate A or P for your shift.
- Apply to any other hubs/junctions that are at risk for contamination.
- A new piece of Parafilm should be reapplied **once per day** and as needed.
- In the event of a contamination, soiled Parafilm should be cleaned prior to removing, and the cap/tubing changed as soon as possible.
- Document Parafilm application with a comment in “**connections checked**” in *Line Care* of IV flowsheet.



CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

Appendix D: INSTRUCTIONAL VIDEOS

DRESSING SECUREMENT

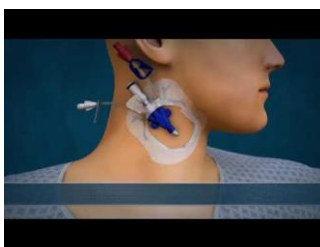
NON-TUNNELED CVC (E.G., IJ)



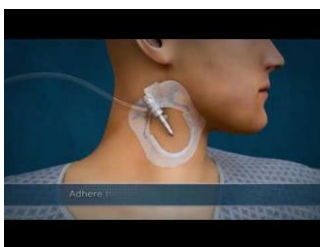
HD TRIALYSIS CATHETER



MAC INTRODUCER CATHETER



PSI INTRODUCER CATHETER



PARAFILM APPLICATION



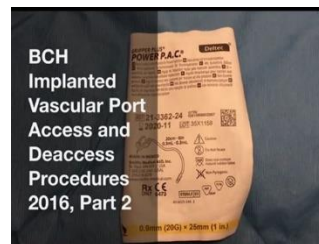
PICC DRESSING CHANGE



PORT ACCESS & DEACCESS PART 1: GRIPPER MICRO (NON-POWER NEEDLE)



PORT ACCESS & DEACCESS PART 2: POWER GRIPPER PLUS (POWER NEEDLE)



CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

SITE-SCRUB



BROVIAC REPAIR

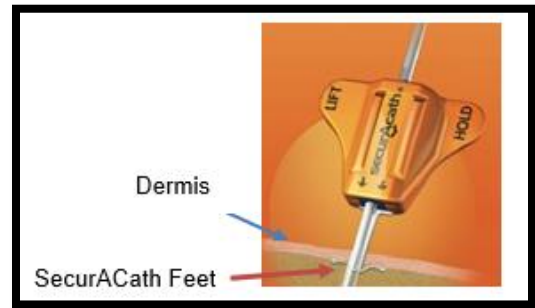


CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

Appendix E: Secur-A-Cath Device for PICC Lines

Secur-A-Cath is a central line securement device used for patients with skin sensitivity, rashes caused by stat Lock devices, allergy to adhesives, or for securement of PICC Line(s) when a stat lock is not appropriate

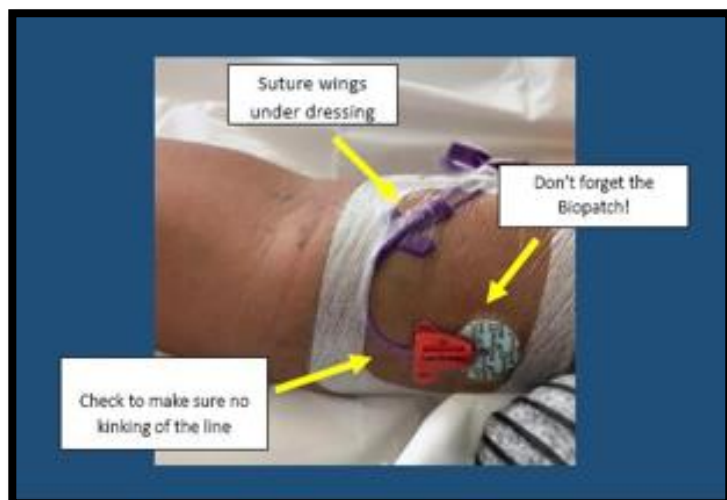
Secur-A-Cath secures the line at the insertion site using small, flexible securement feet placed in the subcutaneous tissue below the dermis



- **Only trained providers (PICC line nurses & Interventional Radiology) may insert and remove the Secur-A-Cath securement device. Call VAST Team PICC Nurses for, troubleshooting, consultation or when planning to remove line**
- One Secur-A-Cath provides continuous securement from the time of catheter placement through the life of the line. Does not need to be changed weekly or require sutures or adhesives; STAT Lock is NOT required when Secur-A-Cath is in place

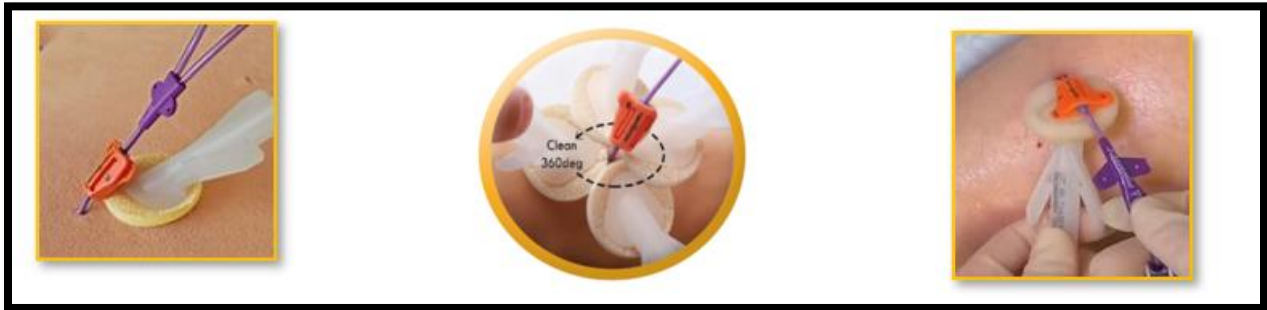
Dressing Change Important Points

- Avoid applying the dressing tightly and do not stretch the dressing when applying since this may cause a pressure injury under the Secur-A-Cath securement device. Do not force the Secur-A-Cath to lay flat. Do not add a cushion or barrier under the Secur-A-Cath device or suture wing site
- Only use a small size Biopatch when a Secur-A-Cath is in place
- Make sure the Secur-A-Cath and suture wing tip sites are completely underneath the dressing. Consult a CVC Resource RN or Unit CNS with any concerns

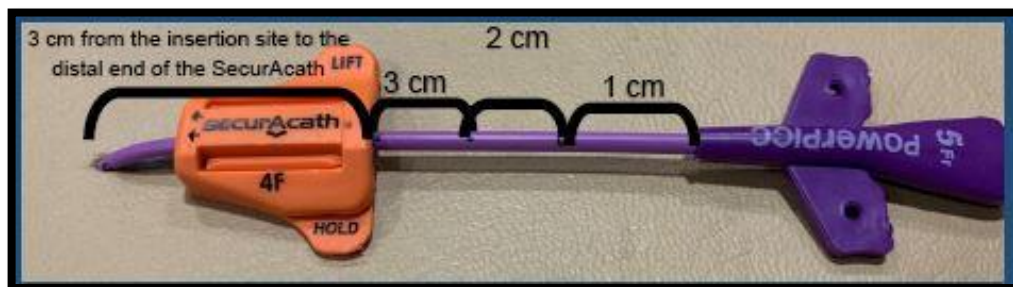


CENTRAL VENOUS CATHETER (CVC) CARE AND MAINTENANCE (*continued*)

- For CLEANING under the device, **gently lift straight up and do not twist or rotate the Secur-A-Cath device from its original position.** Flood insertion site and Secur-A-Cath device with antiseptic solution (CHG or Betadine). Ensure the antiseptic solution is applied to all exterior surfaces of the device



- The Secur-A-Cath securement device is placed at the 3cm mark from the insertion site to the distal end of the Secur-A-Cath. To calculate the external length of a catheter with Secur-A-Cath in place start at the hub site (0cm) then count forward towards the insertion site to the 3cm mark of the distal portion of the Secur-A-Cath device. In this example, the external length is 6 cm



With each dressing change, there is potential for line movement from baseline or device twisting. This will typically result in new onset pain. When this occurs, the dressing must be changed immediately to assess insertion site and reposition Secur-A-Cath device.

- Secur-A-Cath is MRI *conditional* – meaning to assure safety, the tech must adjust scan parameters prior to patient entering MRI space. **Communicate that your patient has a Secur-A-Cath device on the MRI Screening form**