Team Name: Critical Care and Medicine Team Lead: Collaborative Practice Lead Approved by: Regional Lead – Acute Care & Chief Nursing Officer	Reference Number: CLI.4110.PL.004 Program Area: Across Care Areas Policy Section: Patient Care
Issue Date: June 27 2016 Review Date: Revision Date: January 19 2024	Subject: Central Venous Access Device Care and Maintenance

Use of pre-printed documents: Users are to refer to the electronic version of this document located on the Southern Health-Santé Sud Health Provider Site to ensure the most current document is consulted.
Patients were engaged in the development of this policy.

POLICY SUBJECT:
Central Venous Access Devices - Care and Maintenance

PURPOSE:
To provide evidence based standardized approach to care and management of Central Venous Access Devices (CVADs) and reduce risk of complications for all clients with CVADs.

BOARD POLICY REFERENCE:
Executive Limitation (EL-02) Treatment of Clients

POLICY:
The care and management of CVADs is provided by health care providers and students who have the appropriate education, demonstrated competency, and awareness of the standard of care as outlined in this guideline.

DEFINITIONS:
Aseptic Technique: A set of infection prevention actions to protect patients from infection during invasive clinical procedures and maintenance of indwelling medical devices.

Aseptic Non Touch Technique (ANTT): An international clinical practice standard that is a type of aseptic technique used for clinically invasive procedures that achieves demonstrated evidence based proof of reductions in Healthcare Associated Infections (HAIs) across care areas.

Authorized Prescriber: Refers to a Health Care Professional who is permitted to prescribe medications and/or treatments as defined by provincial and federal legislation, his/her regulatory college or association, and practice setting.

Central Venous Access Device (CVAD): A catheter that is inserted into a peripheral or large vein of the upper extremities, chest or groin with the tip advanced to a central position, either the superior or inferior vena cava. Types of CVADs are:

- **Peripherally Inserted Central Catheter (PICC):** Inserted through veins of the upper extremity in adults and children; for infants, may be inserted through veins of the scalp or lower extremity; catheter tip is located in the superior or inferior vena cava, preferably at its junction with the right atrium, regardless of insertion site.

- **Implanted Vascular Access Device (IVAD)**: Also called an Implanted Port. A catheter inserted into a vein, attached to a reservoir located under the skin.

- **Tunneled, Cuffed Catheter:** A type of CVAD with a segment of the catheter lying in a subcutaneous tunnel with the presence of a cuff into which the subcutaneous tissue grows to offer security for the catheter; indicates that the skin exit site and vein entry site are separated by the subcutaneous tunnel (eg. Hickman or Broviac catheters).

- **Non-Tunneled:** A type of CVAD for short-term use that is inserted directly through the skin, usually via the axillary-subclavian, internal jugular, or femoral vein.

- **Hemodialysis Catheters:** <u>For dialysis only</u> (or other uses as specifically ordered by the physician).
  - May have 1 to 3 lumen and may be tunneled or non-tunneled. May be inserted in femoral, jugular or subclavian veins and sutured in place. Nurses certified in dialysis access dialysis catheters.
  - Nurses not certified in dialysis may access dialysis catheters as a last resort ONLY in emergency situations when all other venous access routes have been attempted. A specific physician's order is required. Consultation with dialysis staff is recommended.
  - When a "dialysis type" catheter is inserted for use other than for dialysis, there is a written order from the physician indicating the purpose of the alternate use and the maintenance protocol.

Extravasation: The inadvertent infiltration of vesicant solution or medication into surrounding tissue.

Infiltration: The inadvertent administration of a non-vesicant solution or medication into surrounding tissues.

Vesicant: An agent capable of causing blistering, tissue sloughing or necrosis when it escapes from the intended vascular pathway into surrounding tissue.

IMPORTANT POINTS TO CONSIDER:

- A vascular assessment is performed on clients to determine the best vascular access method for meeting client care needs (ie., peripheral versus central vascular access). Factors that increase difficulty with locating veins include, but are not limited to:
  - Disease processes that result in structural vessel changes (eg, diabetes mellitus, hypertension),
  - History of frequent venipuncture and/or lengthy courses of infusion therapy,
  - Variations in skin between patient populations, such as darker skin tones and excessive hair on the skin,
  - Skin alterations, such as the presence of scars or tattoos,
  - Patient's age,
  - Obesity and/or
  - Fluid volume deficit.
- Vascular access device complications include:
  - Phlebitis - See Table 3 - Phlebitis Scale and Table 4-Visual Infusion Phlebitis Scale in Illustration section of Elsevier https://point-of-care.elsevierperformancemanager.com/skills/77?virtualname=shs,
  - Infiltration and extravasation - See SH-SS "Extravasation Management of Non-Chemotherapeutic Medications (CLI.6010.SG.003)" policy for further detail and "Extravasation List of Irritant Drugs" (CLI.6010.SG.003.SD.01) for infusates with irritant or vesicant potential,
  - Nerve injury - Immediately remove IV catheter if nerve damage related to insertion is suspected (ie., severe electrical shock-like pain, numbness or tingling),
  - Occlusion,
  - Infection - Central vascular access devices (CVADs) are a high risk to cause healthcare-associated infections (HAIs). Aseptic Non Touch Technique (ANTT) with CVAD insertion, care and maintenance is best practice for reducing the risk of infection,
  - Catheter damage,
  - Air embolism,
  - Catheter associated deep vein thrombosis,
  - Malposition - Immediately remove IV catheter and apply pressure if an artery is inadvertently accessed and/or
  - Catheter associated skin injury.

  See Elsevier Table 1 - Complications of Central Venous Access Devices in Illustration section and video Troubleshooting Vascular Access Devices https://point-of-care.elsevierperformancemanager.com/skills/77?virtualname=shs
- Tip location of a CVAD is determined radiographically or by other imaging technologies prior to initiation of infusion therapy or when clinical signs and symptoms suggest tip malposition. In SH-SS, the primary method to confirm initial PICC tip placement is electrocardiogram (ECG).
- An external catheter measurement check is part of daily assessments and is compared to documented external catheter measurement at time of insertion.
  - Two common standardized methods to measure external length are indicated in the Canadian Vascular Access Association (CVAA) External Length Measurement poster
  - External measurement greater than measurement recorded at time of insertion indicates catheter migration. Consult authorized prescriber if this occurs as diagnostic confirmation of catheter placement may be required. It is not acceptable practice to push or advance catheter.

- The recommended antiseptic for skin antisepsis is 2% chlorhexidine (CHG) with 70% alcohol. A 30 second contact time is required and allow to air dry completely, which may take 2 minutes or more.
- The recommended antiseptic for CVAD access and when changing and connecting new add on devices is 70% alcohol. Perform a vigorous scrub for at least 15 seconds and allow to dry completely.
- It is important to use a 10 mL barrel-sized syringe for CVAD flushing and assuring patency.
  - Smaller syringes exert greater pressures (pounds per square inch [psi]) and may cause damage to the device).
  - Solution and/or medication being administered by IV push method are administered using syringe size less than or equal to 10 mL once CVAD patency has been confirmed.
- For CVAD clamping, follow needleless connector Baxter ONE-LINK Needle-Free IV Connector manufacturer instructions for use. For non-valved CVAD, confirm clamp is present and that clamp is engaged when CVAD not in use. Any CVAD that has a clamp on it is non-valved.
- Scissors are never used when changing the dressing of any CVAD.
- To prevent unnecessary delays in removing lines that are no longer required: for admitted clients, review CVAD necessity daily; for community based services, review CVAD necessity at each episode of care.
- Sterile gloves are not routinely required when providing CVAD care. However, sterile gloves are worn if direct handling and contact with the catheter is required.
- Groshong PICCs are uncommon; follow manufacturer's instruction for care and maintenance.
- For hemodialysis catheter care and maintenance, refer to Manitoba Renal Program (MRP) Policies & Procedures using Firefox browser:
  - 30.20.02 Accessing and Locking Dialysis Central Venous Catheter (Anticoagulant/Thrombolytic/Antibiotic Locking) http://www.kidneyhealth.ca/files/P&P/30.20.02.pdf
  - 30.20.18 Accessing and Locking of Hemodialysis CVC by Non-Hemodialysis Personnel for Urgent Situations http://www.kidneyhealth.ca/files/P&P/30.20.18.pdf
  - 30.20.08 Alteplase for Clearing Hemodialysis Catheter Thrombosis using the Push (30 minute) Method http://www.kidneyhealth.ca/files/P&P/30.20.08.pdf
  - 30.20.10 Alteplase for Hemodialysis Central Venous Catheter (Dwell procedure) http://www.kidneyhealth.ca/files/P&P/30.20.10.pdf

PROCEDURE:

1. **Accessing and Discontinuing an Intermittent or Continuous infusion**

- Patients transferred from facilities external to region, may have a CVAD locked with solution other than 0.9% Sodium Chloride. Withdraw solution from the CVAD lumen before accessing, and discard.
  1. Perform hand hygiene.
  2. Prime IV administration set with ordered IV solution. To remove air, invert and tap on back-check valve and side port while priming.
  3. Place administration set in infusion pump and set infusion rate.
  4. Assess client and CVAD site.
  5. Determine the appropriate lumen to be used for the infusion.
  6. Disinfect needleless connector with 70% alcohol and allow to dry completely.
  7. Check for patency:

1.7.1 Attach 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride and flush with 5 mLs using pulsating turbulent method.
1.7.2 Aspirate to check for blood return. If blood return is prompt and brisk, continue to flush the device with the remainder of the NS. Repeat with second 10 mL NS syringe.
1.7.3 If blood return is not present, refer to Management of Occluded Central Venous Catheter.
1.7.4 Remove syringe.

- Maintain sterility and connect administration set to CVAD through the injection cap.
- Begin infusion and observe for untoward signs and symptoms such as swelling and pain or adverse drug reactions.
- Anchor administration set tubing to minimize tension on the CVAD (Note: Do not use tape or pins on the catheter).
- All IV connection sites are kept visible and frequently inspected to avoid undetected disconnections.
- Discontinue:

1.7.5 Perform hand hygiene.
1.7.6 Stop infusion.
1.7.7 Disconnect tubing from injection cap, ensuring injection cap remains secured to catheter.
1.7.8 If infusion is to be resumed later, attach sterile dual luer lock to administration set. If the infusion is discontinued, discard administration set.
1.7.9 Flush and lock CVAD as per following procedure.

2. Flushing and Aspirating a CVAD

- CVADs are flushed when the device is first started.
- For a continuous infusion, maintain a closed system by using lower port of administration set to flush pre and post medications.
- CVADs are flushed and aspirated:
  - Prior to each infusion,
  - With each needleless connector change,
  - With each administration set change,
  - At least every 7 days and
  - With each non-coring implanted vascular access device (IVAD) access needle change. Note: for a non-accessed/not in use IVAD, flush no more frequently than monthly; consider extending frequency to 3 months.

2.1. Gather supplies.
2.2. Perform hand hygiene.
2.3. Don gloves.
2.4. Disinfect needleless connector with approved antiseptic and allow to dry completely.
2.5. Attach 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride to needleless connector while maintaining sterility of syringe tip.
2.6. Open CVAD clamp, if present.
2.7. Slowly inject 0.9% Sodium Chloride into CVAD, noting any resistance or sluggishness of flow, and slowly aspirate until brisk blood return is obtained.
  - If an antimicrobial locking solution was used, withdraw solution from the CVAD lumen before flushing, and discard.

- Inability to flush or absence of a blood return from a CVAD requires further investigation about the cause (eg, mechanical problem, fibrin/thrombosis over CVAD tip, extravascular tip location).
- A pulsatile or "push-pause" flushing technique of 10 short boluses of 1 mL interrupted by brief pauses may be effective at removing solid deposits.
- Never inject against resistance.

2.8. Remove syringe and discard.
2.9. Initiate and discontinue infusion therapy as indicated in Procedure section 1 above.
2.10. Disinfect needleless connector with approved antiseptic and allow to dry completely.
2.11. Attach 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride to needleless connector, while maintaining the sterility of the syringe tip.
2.12. Slowly inject 0.9% Sodium Chloride into CVAD and administer the flush at the same rate as the administration rate of the medication left in the CVAD lumen.
- Note any resistance or sluggishness of flow.
- A pulsatile flushing technique of 10 short boluses of 1 mL interrupted by brief pauses is effective at removing solid deposits.

2.13 Ensure the correct flow rate if continuous fluids are infusing or proceed with locking the CVAD.

3. Locking a CVAD

- An authorized prescriber's order for locking is not required. Refer to the Central Venous Access Devices Locking Guidelines (CLI.4110.PL.004.SD.01) for a summary of CVAD locking direction.
- Document all locking solutions on the Medication Administration Record (MAR).

3.1. CVAD locking procedure is performed once flushing procedure is completed as indicated in Procedure section 2 above.
3.2. Gather supplies
3.3. Perform hand hygiene.
3.4. Don gloves.
3.5. Disinfect needleless connector with approved antiseptic and allow to dry completely.
3.6. Attach 10 mL prefilled syringe with preservative-free 0.9% sodium chloride to lock CVAD.
- If blood is aspirated into flush syringe, continue the flush and use a second syringe for locking.
- Alternative catheter compatible lock solutions such as heparin solution [10 units/mL], ethanol, taurolidine, sodium citrate or ethylenediaminetetra-acetic acid (EDTA) are used for some patients. Aspirate alternative lock solution prior to use of CVAD or according to manufacturer's instructions for use. Label line if solution other than 0.9% sodium chloride is used to lock CVAD.

3.7. Slowly inject solution into CVAD.
3.8. Follow appropriate clamping sequence to reduce blood reflux based on type of needleless connector used:
- Negative displacement – flush, clamp, disconnect.
- Positive displacement – flush, disconnect, clamp.
- Neutral and antireflux – no specific sequence required.

3.9. Discard syringe and used supplies in appropriate receptacles.
3.10. Remove gloves and perform hand hygiene.

4. Administration Set Management

- Administration sets with luer-lock design are used to ensure a secure connection, reduce manipulation, and minimize the risk of leaks, disconnections, or misconnections.
- Use administration sets with integrated add-on devices (eg, filters) to minimize the number of connections, thus reducing the risk of contamination, misuse, and accidental disconnection.
- Use administration sets with anti–free flow (eg. B.Braun-anti-syphon valve (ASV) mechanisms with electronic infusion pumps.
- Do not use administration sets that have injection ports for high-risk medications delivered via an epidural, intrathecal, or arterial route.
- Use a primary continuous administration set that contains a back-check valve or use a dedicated pump set with integrated mechanisms to prevent retrograde flow of the secondary medication into the primary solution container.
- Use an extension set with multiple lumens when multiple administration sets must be connected to the same CVAD lumen. Delays in flow rates, leakage from the infusion system, and other unintended therapy interruptions are reduced with these extension sets as compared to a manifold of multiple stopcocks.
- Use administration sets with composite material recommended for drugs at risk of tubing adsorption, which may affect accuracy of drug delivery (eg, nitroglycerin, diazepam, insulin). Monitor clinical response to medication.
- Use a non-DEHP (Di-ethylhexyl-phthalate, a known toxin) administration set when leeching of PVC (polyvinyl chloride) is of concern (e.g., lipid-based solution, certain chemotherapy agents)
- Prime and attach administration sets just before use.
- Adhere to Standard-ANTT when connecting, changing, and accessing administration set injection ports.
- Avoid disconnecting primary and secondary continuous administration sets whenever possible.
- Attach a new, sterile, compatible covering device to the male luer end of the administration set after each intermittent use. Do not attach the exposed male luer end of the administration set to a port on the same administration set (ie, “looping”).
- Never use an administration set for more than 1 patient.
- Label administration sets.
  - Indicate the date of initiation or the date the set was replaced.
  - When there are different access sites (ie, intraspinal, intraosseous, subcutaneous) or multiple solution containers connected to a CVAD, label the tubing with the route and/or medication/solution near the connection to the solution container and near the patient’s access site.
  - In multi-lumen catheters, each lumen will be designated for a specific purpose, including: one for blood withdrawal; if applicable, one lumen specifically dedicated for TPN; and one for other uses. This information is included in the care plan and transcribed onto the Kardex.
- In a multi-lumen power PICC, all lumen open at the same point. Negative pressure applied to one lumen may cause negative pressure in the other lumen. This could result in back flow of blood into adjacent lumen. To prevent occlusion from this back flow, positive pressure is applied to all other lumen by flushing with 10 mL of preservative-free 0.9% sodium chloride. Exception, if IV fluid is flowing continuously, no flushing is required.

- Trace all catheters/administration sets/add-on devices between the patient and solution container to the VAD before connecting or reconnecting any infusion/device, at each care transition to a new setting or service, and as part of the handoff process.
- Minimize risk of strangulation or entanglement related to the use of administration sets.
- For administration set change frequency, see Appendix with Table 1-Administration Set Change Frequency by Administration Type and Table 2-Administration Set Change Frequency by Infusate. Also consider:
  - Use of a new administration set when initiating a new concentration of a continuous intravenous (IV) medication to prevent infusing any of the previous concentration remaining in the tubing at the rate intended for the new concentration.
  - Change administration set immediately if contamination is suspected or product integrity is compromised.
  - Change add-on device(s) at least every 4 to 7 days, with every new CVAD insertion, if accidentally removed, contaminated, if blood residue remains, with each administration set change, and whenever the integrity of the product is compromised.

5. **Needleless Connector Change**
   - Needleless connectors are changed at least every 7 days, with every new CVAD insertion, if accidentally removed, contaminated, if blood residue remains, with each administration set change, and whenever the integrity of the product is compromised.
   - Coordinate changing of cap with routine flushing, locking and with dressing change and securement device change (if required).

5.1. Perform hand hygiene.

5.2. Attach and prime replacement needleless connector with 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride, leave syringe attached.

5.3. Clamp catheter lumen if required.

5.4. Scrub injection cap at connection of lumen with approved antiseptic for 5-15 seconds.

5.5. Remove injection cap and attach replacement cap ensuring it is firmly attached.
  - To avoid overtightening, grasp the needle-free connector body during access, attachment, and removal.

5.6. Open clamp, if appropriate, flush and lock if required or resume infusion.

6. **Dressing Change**
   - Transparent semipermeable membrane (TSM) dressings and TSM dressings with an integrated securement device (ISD) should be changed at least every 7 days or immediately if dressing integrity is disrupted (eg, lifted/detached on any border edge or within transparent portion of dressing; visibly soiled; presence of moisture, drainage, or blood) or compromised skin integrity is present under the dressing.
   - Change non-transparent dressing:
     - If unable to assess site, every 2 days or if dressing integrity is disrupted (eg, if damp, loosened or visibly soiled).
     - Collaborate with clinical resources to consider extending dressing change up to every 7 days based on clinical assessment, ability to palpate site, and in the absence of any signs or symptoms of infection.
     - Replace gauze dressing as soon as possible with sterile transparent film dressing Note that a gauze dressing underneath a TSM dressing is considered a non-transparent dressing, unless the site is not obscured.

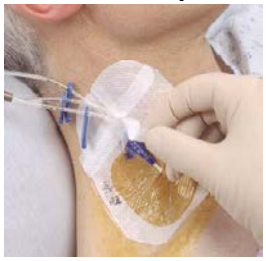
- Remove adhesive securement devices (ASDs) with each dressing change to allow for appropriate skin antisepsis and application of a new ASD.
- Tissue adhesive (TA), if used, is reapplied at each dressing change.
- Subcutaneous anchor securement systems (SASS) designed to remain in place for the life of the CVAD do not need to be removed and replaced regularly with each dressing change, however they are assessed during catheter care and management to ensure integrity.

6.1. Gather supplies
6.2. Perform hand hygiene.
6.3. Don mask.
6.4. Assemble supplies on sterile field.
6.5. Don nonsterile gloves
6.6. Assess insertion site for absence of redness, tenderness, swelling, or drainage; palpate site for any local tenderness. If present, contact the provider for a collaborative decision regarding interventions, including potential device removal. Assess the integrity of SASS, if used.
6.7. Remove existing dressing, beginning at device hub, and gently pull the dressing perpendicular to the skin toward the insertion site. Avoid inadvertently dislodging the catheter, as it may be adhered to the dressing.
6.8. Remove securement device or product (unless SASS is used).
6.9. Remove gloves.
6.10. Perform hand hygiene.
6.11. Don sterile gloves.
6.12. Identify catheter tip dislodgement by routinely assessing for changes in external catheter length.
6.13. Cleanse insertion site with 2% chlorhexidine (CHG)/70% alcohol providing a 30-second contact time. Scrub back and forth to the anticipated size of dressing including catheter. Allow to air dry completely. This may take 2 minutes or longer.
6.14. Apply skin barrier solution. If using a chlorhexidine-impregnated sponge or dressing with gel component, do not apply solution directly underneath sponge or gel.
6.15. Apply chlorhexidine-impregnated sponge, if used.
6.16. Apply new securement device/product.
6.17. Apply sterile dressing to insertion site.
6.18. Discard used supplies in appropriate receptacles.
6.19. Remove gloves and discard.
6.20. Perform hand hygiene.
6.21. Label dressing with date performed.

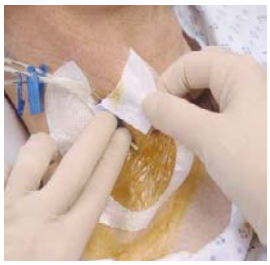
Dressing change and PICC dressing of StatLock® device shown below (see diagrams). Note: Some dressing supplies in photos may differ from those used in current practice.

See BD You Make All the Difference-CVAD Care & Maintenance video as additional resource for further explanation of the above techniques.
(https://bd.showpad.com/share/EgDGjX4VoT832h30vVP8y)

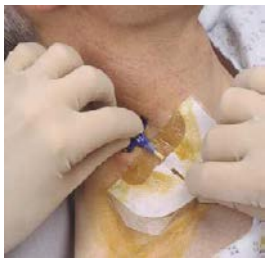
Removal of Transparent Film Dressing



1. Remove tape strips from top of dressing. Saturate with alcohol to release adhesive if necessary.



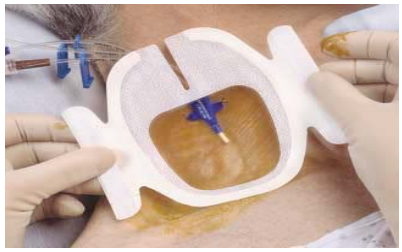
2. Start dressing removal by separating cloth tabs, then gently peel dressing back toward insertion site.



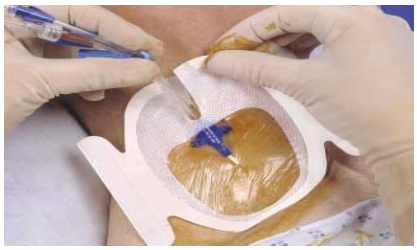
3. Avoid skin trauma by peeling dressing back on itself, rather than pulling up from skin.

Application of Transparent Film Dressing - Choose the appropriately sized dressing depending on the type and size of CVAD that is dressed.

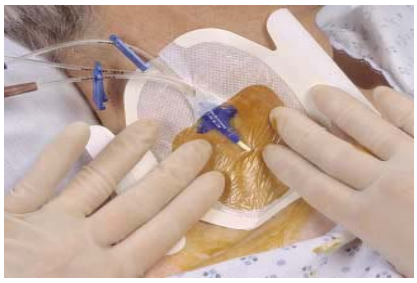
1. Peel the backing off dressing, exposing adhesive. Do not stretch dressing.



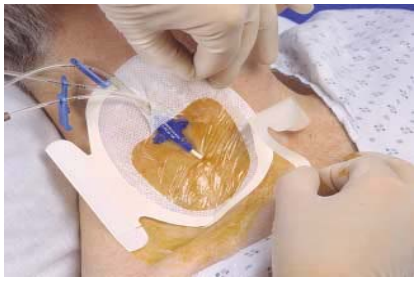
2. Adhere centre of transparent window over insertion site, while holding notched portion off skin.



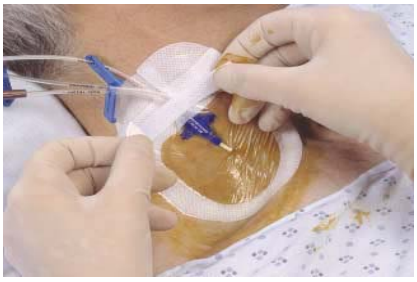
3. Overlap soft cloth tabs under catheter to form a seal around catheter hub and lumens.



4. Press dressing into place.



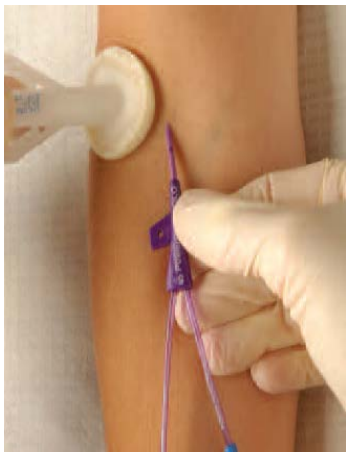
5. Smooth dressing from centre toward edges, using firm but gentle pressure to enhance adhesion. Remove frame while smoothing down dressing edges

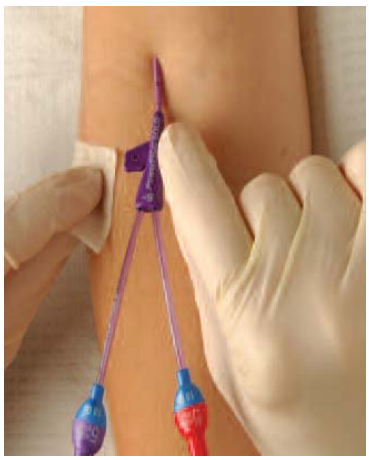


6. Use provided tape strips to secure hub, lumens or tubing. Label dressing with date, time and initials.

PICC with Transparent Film Dressing

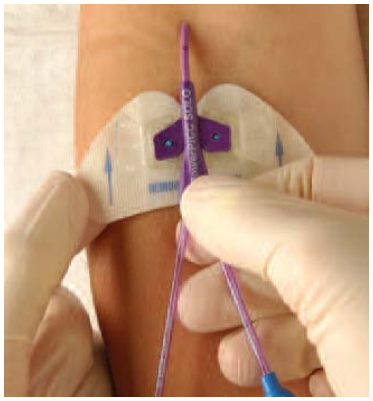
StatLock® Device Application Technique

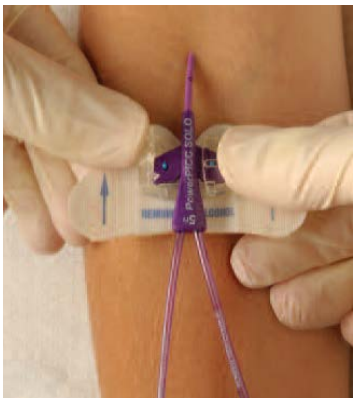




Prep

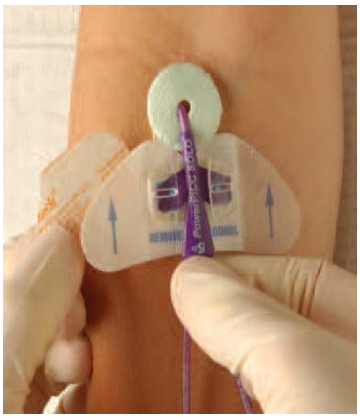
1. Cleanse insertion site and surrounding skin for at least 30 seconds. Allow to dry completely.
2. Apply provided skin prep to proposed StatLock® securement site (provided in package). Allow to dry completely.

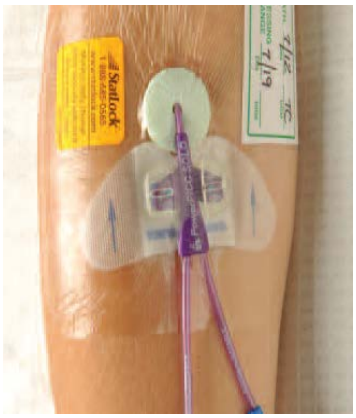




Press

3. Align StatLock® so directional arrows point towards insertion site.
4. Place one suture hole in catheter wing over first post, then slide catheter over to capture second post.
5. Support undersurface of anchor pad and catheter while closing retainer doors.



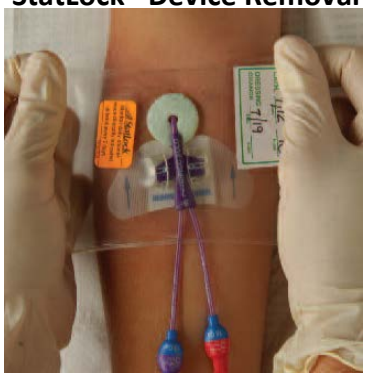
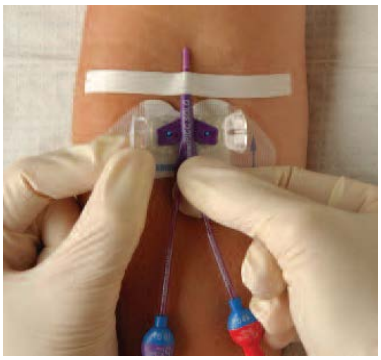
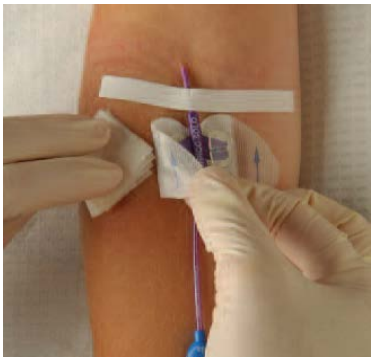
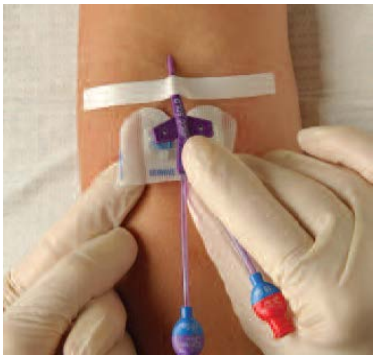


Place and Peel

6. Peel away paper backing from anchor pad, one side at a time, while placing on skin.
7. Apply transparent film dressing over the entire PICC and the StatLock® device ensuring exit site and the entire line is covered.
8. Apply dressing change label.

HG disk is not currently being used in the region.

StatLock® Device Removal Technique

1. Remove transparent dressing by gently peeling dressing back toward the insertion site.
2. Stabilize catheter while holding the StatLock® device being careful not to dislodge the catheter.
3. Gently lift retainer doors to release catheter from device. Carefully remove PICC from StatLock® device.
4. Lift edge of StatLock® pad and gently remove it. If necessary, use 3-4 alcohol pads to dissolve adhesive. Do not pull or force pad to remove it.
5. Fold adhesive anchor pad underneath device and discard
6. Reapply another StatLock® stabilization device as required

7. Obtain a Blood Sample

- When choosing the lumen to be used for blood withdrawal, take into consideration:
  - The lumen designated on the Kardex/Care Plan,
  - Size of lumen – the larger, the better,
  - Medications being infused and
  - Test(s) ordered.

7.1. Perform hand hygiene.

7.2. Don clean gloves.

7.3. Remove needleless connector and replace with new connector, if withdrawing blood for blood culture to decrease the risk of false positive culture results.

7.4. Stop all infusions through the catheter, clamping lumens and/or stopping infusions as appropriate. Withdraw blood from most distal lumen, if drawing from staggered multilumen CVAD or use the lumen recommended by the manufacturer.

- Stop all infusions for at least 1 minute prior to blood sampling.

7.5. For syringe method:

7.5.1. Disinfect the needleless connector, if present, by scrubbing with a new disinfectant pad and allowing to dry; then attach an empty syringe to the needleless connector.

7.5.2. Detach the administration set from the CVAD hub if administering a continuous infusion and attach an empty syringe. Cover the male luer end of the administration set with a sterile end-cap. Do not allow the male luer end to touch any other object to prevent contamination.

7.5.3. Open CVAD clamp, if present, and aspirate 4 to 5 mL of blood into syringe, and discard into sharps container.

7.5.4. Disinfect the needleless connector, if present, by scrubbing with a new disinfectant pad and allowing to dry.

7.5.5. Attach an empty syringe and aspirate the needed blood volume. Use slow, gentle technique to withdraw blood. The flow of blood is improved with a small syringe (eg, 3 mL) over a large syringe (eg, 10 mL).

7.5.6. Detach filled syringe.
7.5.7. Disinfect the needleless connector, if present, by scrubbing with a new disinfectant pad and allowing to dry.
7.5.8. Flush the CVAD with 10 mL of preservative-free 0.9% sodium chloride, and lock CVAD or reattach the administration set, and resume infusion as ordered.
7.5.9. Using a needleless transfer device, fill the appropriate vacuum tubes with the designated volume of blood in the correct order of draw. After collection, invert tube fully (to mix additive in collection tube with blood specimen) and adhere to number of inversions required.

7.6. For vacuum tube method:
7.6.1. Disinfect the needleless connector by scrubbing with a new disinfectant pad and allowing to dry; then attach the vacuum tube holder to needleless connector.
7.6.2. Detach the administration set from the CVAD hub if administering a continuous infusion. Cover the male luer end of the administration set with a sterile end-cap. Do not allow the male luer end to touch any other object to prevent contamination.
7.6.3. Insert a vacuum tube into the holder and attach to hub of CVAD catheter.
- Use a collection tube designed for discard (no additives) to prevent contamination of next blood draw.

7.6.4. Open CVAD clamp, if present, and aspirate 4 to 5 mL of blood, and discard this tube of blood into sharps container.
- May also use empty flush syringe to draw discard sample after flush.

7.6.5. Insert the vacuum tubes into the holder in the correct order of draw and allow each tube to fill to the needed volume. After collection, invert tube fully (to mix additive in collection tube with blood specimen) and adhere to number of inversions required.
7.6.6. After all tubes are filled and withdrawn from the holder, detach the holder and discard into sharps container.
7.6.7. Disinfect the needleless connector, if present, by scrubbing with a new disinfectant pad.
7.6.8. Flush CVAD with 10 mL of preservative-free 0.9% sodium chloride, and lock CVAD or resume infusion as ordered.

7.7. Push Pull Method used when reducing blood loss is a factor because there is no discarded blood:
7.7.1. Disinfect the needleless connector by scrubbing with a new disinfectant pad and allowing to dry.
7.7.2. Attach 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride to needleless connector and flush CVAD.
7.7.3. Without removing syringe, aspirate 6 mL of blood, then reinject blood into CVAD.
7.7.4. Repeat this process. There is no consensus on the required number of push-pull cycles or the volume of blood to be pulled; however, 3 to 5 cycles are common.
7.7.5. Remove the empty syringe and attach new syringe/vacuum tube holder to obtain needed blood sample as per procedures above.

7.8. Label blood samples before leaving patient.
7.9. Remove gloves an perform hand hygiene.
7.10. Send samples to laboratory for testing.

8. Implanted Vascular Access Device (IVAD)-Also known as Implanted Port

- Use only noncoring safety needles to access the port.
- Access the port with the smallest gauge noncoring needle to accommodate the prescribed therapy and a length that allows the external components (eg, wings) to sit level with the skin and securely within the port (needle touches bottom of port upon insertion).
- Secure the noncoring needle with sterile tape strips to reduce risk of dislodgement and other complications
- A sterile transparent semipermeable membrane (TSM) dressing is maintained over the access site if the port remains accessed. The dressing is changed at least every 7 days. If gauze is needed over the noncoring needle and access site, change the dressing every 2 days. When gauze is used under the TSM dressing to solely support the wings of a noncoring needle,it does not obscure the access site, and its integrity is not compromised (eg, not visibly soiled and remains free of moisture, drainage, or blood), change the TSM dressing at least every 7 days.
- Change non-coring needle every 7 days when access is required for ongoing infusion therapy. Consider changing at 8 days if coinciding with administrative set change.
  - It is acceptable for the gripper to remain in situ for 7-8 days (outpatients included) to reduce the number of times the port is accessed and decrease the risk of infection and skin breakdown.

8.1. To Access IVAD/Implanted Port

8.1.1. Consider using topical anesthetic as indicated

8.1.2. Perform hand hygiene.

8.1.3. Assess skin over and around implanted port; palpate port to locate septum. If signs and symptoms of infection are present, notify physician and send swab for C & S as ordered. Complete appropriate reporting of infection form(s).

8.1.4. Don mask and sterile gloves.

8.1.5. Attach needleless connector to hub of extension set on noncoring needle with extension set, and prime set with preservative-free 0.9% sodium chloride.

8.1.6. Prep the skin in the entire area where the dressing will cover with ~~a~~ 2% chlorhexidine/70% alcohol for 30 seconds using a back and forth motion. Allow to air dry completely. This may take 2 minutes or longer.

8.1.7. Grasp septum with thumb and index finger of non-dominant hand. Septum must be held firmly as the needle is guided in.

8.1.8. Insert noncoring needle perpendicular to the skin, through septum of the port, until the needle tip comes in contact with the back of the port.

8.1.9. Slowly inject preservative-free 0.9% sodium chloride into implanted port, noting any resistance or sluggishness of flow; slowly aspirate for blood return the color and consistency of whole blood, and then complete 0.9% sodium chloride flush.

8.1.10. Place sterile gauze or foam pad to support wings of noncoring needle if needed, making sure gauze does not obscure needle insertion site. Cover with TSM dressing.

8.1.11. Initiate infusion therapy as prescribed.

8.1.12. Discard supplies in appropriate receptacle(s).

8.1.13. Remove gloves and perform hand hygiene.

8.2. To De-Access IVAD/Implanted Port

8.2.1. Perform hand hygiene.

8.2.2. Apply nonsterile gloves.

8.2.3. Scrub injection cap with approved antiseptic and allow to dry.

8.2.4. Attach 10 mL prefilled syringe of preservative-free 0.9% sodium chloride.

8.2.5. Slowly inject to flush and lock.

- Flush and lock accessed but noninfusing implanted vascular access ports daily using at least 10 mL of 0.9% sodium chloride.
- For IVADs that are not accessed, flush and lock monthly. Consider extending maintenance flushing and locking to every 3 months with 10 mL 0.9% sodium chloride and 3 to 5 mL heparin (100 units/mL).

8.2.6. Remove dressing, noting any drainage, and discard.

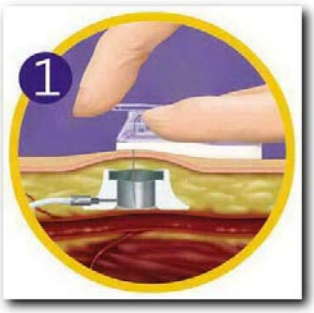
8.2.7. Stabilize port using thumb and forefinger of nondominant hand.

8.2.8. Grasp needle with dominant hand and remove device (refer to removal pictures below), engage safety mechanism according to manufacturers' directions for use, and discard into sharps container.

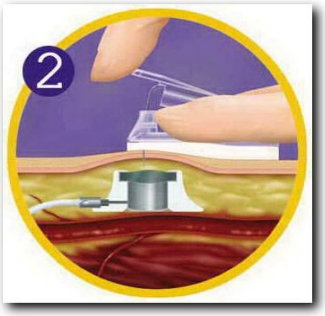
8.2.9. Apply dressing to site if bleeding occurs.

8.2.10. Discard materials in appropriate receptacles.

8.2.11. Remove gloves and perform hand hygiene



From behind GRIPPER PLUS Safety Needle, place fingers on each side of base to stabilize it. With other hand, place a finger on tip of safety arm



Begin to lift safety arm straight back. Notice that needle comes out straight

Continue lifting safety arm until needle "clicks" into lock position. It is now safely locked ready to be disposed of in sharps container

9. Management of a Partial Thrombotic or Nonthrombotic Occlusion

9.1. Identify most recent use of catheter.

9.2. Examine the CVAD and administration set for kinks or obstruction.

9.3. Consider that catheter may be positional. Techniques like repositioning patient, turning head to opposite direction, placing rolled towel between scapulae, raising arm over head, may be helpful to better position device in the vessel.

9.4. Obtain authorized prescriber's order for use of alteplase (Cathflo®). See alteplase (Cathflo) parenteral monograph for preparation and administration details.

9.5. Perform hand hygiene.

9.6. Prepare alteplase

9.7. Perform hand hygiene

9.8. Don clean gloves

9.9. Disinfect needleless connector with antiseptic solution and allow to air-dry.

9.10. Clamp CVAD, if appropriate.

9.11. Attach 10 mL syringe with alteplase to the needleless connector.
- Alternatively, remove the needleless connector, because it could be a source of infection and/or thrombus, and prepare to attach the syringe directly to the CVAD hub.

9.12. Unclamp CVAD, if appropriate, and slowly inject alteplase. Do not force solution into CVAD.
9.13. Clamp CVAD, if appropriate, and leave syringe attached. Label CVAD "Do not use" with date, time, and initials.
9.14. Allow alteplase solution to dwell for 60 minutes.
9.15. Unclamp CVAD, if appropriate, and attempt to aspirate blood.
- Free-flowing blood return the color and consistency of whole blood indicates patency.
- If patency is reestablished, withdraw a total of 4 to 5 mL of blood, clamp CVAD, if appropriate, and remove and discard syringe into biohazard container.
- Repeat procedure once if patency not achieved.

9.16. Attach 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride, unclamp CVAD, if appropriate, and flush using positive-pressure method.
9.17. Resume infusion therapy as ordered or lock catheter as appropriate.
9.18. Dispose of used supplies in appropriate receptacles.
9.19. Remove gloves.
9.20. Perform hand hygiene.
9.21. Notify authorized prescriber if unable to achieve patency. An option may be for alteplase to dwell for 24-72 hours or to administer alteplase using either the Push Method or the Low-Dose Infusion Method.
- Push Method-This method of alteplase administration may be considered for PICCs, IVADs and tunneled devices of smaller lumen size when there is a recurrence of partial and withdrawal occlusions after multiple direct instillations of alteplase.
- Low Dose Infusion Method- May be considered for PICCs, IVADs and tunneled devices of smaller lumen size when there is a recurrence of partial and withdrawal occlusions after multiple direct instillations of alteplase, including administration by push method.

10. Management of Complete Occlusion

10.1. Obtain authorized prescriber's order for use of alteplase (Cathflo®). See Adult Parenteral Monograph for Alteplase (Cathflo) and Pediatric Parenteral Monograph for Alteplase (Cathflo) for preparation and administration details.
10.2. Perform hand hygiene.
10.3. Prepare alteplase.
10.4. Perform hand hygiene.
10.5. Don clean gloves.
10.6. Clamp CVAD if appropriate.
10.7. Single Syringe Method (See Appendix 2-Alteplase Administration Using Single Syringe Method-Figure 1)
10.7.1. Attach 10 mL syringe with alteplase to the needleless connector. Alternatively, remove the needleless connector as it could be a source of infecting organisms and/or thrombus and prepare to attach the syringe directly to the CVAD hub.
10.7.2. Unclamp CVAD, if appropriate, and, while holding syringe vertically, gently aspirate until plunger reaches approximately 8-mL mark (negative pressure technique).

10.7.3. While maintaining syringe in vertical position, slowly release the plunger and repeat step until solution is pulled into the CVAD. Never apply pressure to plunger. Clamp CVAD, if appropriate.
10.7.4. Leave syringe in place and secure. Label syringe “Do not use” with date, time, and initials.
10.7.5. Allow alteplase to dwell in CVAD lumen for 60 minutes.
10.7.6. Unclamp CVAD and attempt to aspirate blood.
- Free-flowing blood return the color and consistency of whole blood indicates patency.
- If patency is reestablished, withdraw a total of 4 to 5 mL of blood, clamp CVAD, and remove and discard syringe into biohazard container.
- Repeat procedure once if patency not achieved.

10.8. Stopcock Method (See Appendix 2-Alteplase Administration Using 3-way Stopcock Method-Figure 2a, 2b,2c)
10.8.1. Disinfect junction of CVAD and needleless connector with antiseptic solution and allow to air-dry.
10.8.2. Remove needleless connector and aseptically attach stopcock to the CVAD hub; turn off from the patient to the CVAD hub.
10.8.3. Attach empty sterile 10-mL syringe to 1 port of stopcock.
10.8.4. Attach 10-mL with alteplase to second stopcock port.
10.8.5. Open stopcock port connected to empty syringe.
10.8.6. Aspirate empty syringe to 8 to 9 mL while maintaining plunger position, then close port (negative pressure technique).
10.8.7. Open stopcock connected to syringe with alteplase, allowing solution to enter the CVAD lumen.
- Procedure steps 10.7.6 and 10.7.7. may need to be repeated until solution is pulled into the CVAD.

10.8.8. Secure device “unit” (stopcock/syringes) to patient and label “Do not use” with date, time, and initials.
- May opt to remove stopcock and syringes and replace with sterile needleless connector during dwell time; however, increased manipulation at hub increases risk of contamination if the procedure needs to be repeated.

10.8.9. Allow alteplase to dwell in CVAD lumen for 60 minutes.
10.8.10. Disinfect needleless connector (if used to replace stopcock unit) with antiseptic solution and allow to dry.
10.8.11. Aseptically attach 10-mL syringe and attempt to aspirate blood (if previous syringe is left attached to stopcock, another one is not needed).
- Free-flowing blood return that is the color and consistency of whole blood indicates patency.
- If patency is reestablished, withdraw a total of 4 to 5 mL of blood, clamp CVAD, and remove and discard syringe into biohazard container.
- Repeat procedure once if patency not achieved.

10.9. Attach 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride, unclamp CVAD, if appropriate, and flush using positive-pressure method.
10.10. Resume ordered therapy or lock catheter as appropriate.
10.11. Dispose of used supplies in appropriate receptacles.
10.12. Remove gloves.
10.13. Perform hand hygiene.

10.14. Notify authorized prescriber if unable to achieve patency. An option may be for alteplase to dwell for 24-72 hours.
- For IVADs only, the Dual Syringe and Non-Coring IVAD Access Needle Method may be considered as alternative when other methods of occlusion treatment are not successful. See Appendix 2-Figure 3a,3b).

10.14.1. Collect one empty 10mL syringe and one 10 mL pre-filled syringe of preservative free 0.9% Sodium Chloride.
10.14.2. Attach each to non-coring needle.
10.14.3. Attach needles close to each other within septum of IVAD.
10.14.4. Use pumping technique by alternating aspiration with empty syringe and infusing small amounts of 0.9% Sodium Chloride.

11. CVAD Removal

- Tunneled and non-tunneled CVADs are only removed by a physician. PICC line removal may be performed by other health care providers (ie. Nurses) that have completed additional education and maintain competency in skill.

11.1.0 Removal of PICC line:
11.1.1. Gather supplies
11.1.2. Perform hand hygiene.
11.1.3. Don gloves.
11.1.4. Discontinue all infusates and/or clamp extension set.
11.1.5. Position patient in semi-Fowler's position, maintaining exit site below level of the heart. Supine or Trendelenburg position is optional for PICC removal.
11.1.6. Remove dressing from insertion site.
11.1.7. Remove securement device or product. If a subcutaneous anchor securement system (SASS) is in place, follow manufacturers' directions for removal.
11.1.8. Inspect catheter-skin junction.
11.1.9. Instruct the patient to perform a Valsalva maneuver during catheter withdrawal.
11.1.10. Hold gauze gently to insertion site with nondominant hand. With dominant hand, slowly remove catheter; use gentle, even pressure.
- Use extreme caution when removing CVAD to prevent air embolism.
- Stop removal procedure if resistance is met.
- Redress catheter site with sterile dressing and attempt interventions, such as a warm compress above the exit site, relaxation techniques, and limb elevation.
- Reattempt removal after 15 to 30 minutes.
- Consult with provider if resistance continues.

11.1.11. After removal of a CVAD, apply digital pressure until hemostasis is achieved by using manual compression with a sterile, dry gauze pad.
11.1.12. Apply an air-occlusive dressing (eg, petroleum gauze) to the access site for at least 24 hours to occlude the skin-to-vein tract and to decrease the risk of retrograde air emboli.
11.1.13. Patient should remain in supine position for 30 minutes after PICC removal.
11.1.14. Inspect catheter: it is intact, the tip is not jagged, and the length is appropriate for product, to ensure entire catheter is removed.
11.1.15. Leave dressing in place for at least 24 hours. Change dressing every 24 hours until exit site has healed.

12. Patient Education

- See CLI.4110.PL.004.SD.02 Peripherally Inserted Central Catheter Teaching Sheet and/or CLI.4110.PL.004.SD.02.F Peripherally Inserted Central Catheter Teaching Sheet – French.

13. Documentation:

- Document assessments, interventions, and outcomes on the CLI.4110.PL.004.FORM.01 Central Venous Access Device Flow Sheet and approved organizational charting forms.
- If the site does not use a flow sheet that incorporates CVAD assessments, the *Central Venous Access Devices Flow Sheet* may be used.

SUPPORTING DOCUMENTS:

CLI.4110.PL.004.FORM.01	Central Venous Access Device Flow Sheet
CLI.4110.PL.004.SD.01	Central Venous Access Devices Locking Solutions Guidelines
CLI.4110.PL.004.SD.02	Peripherally Inserted Central Catheter Teaching Sheet
CLI.4110.PL.004.SD.02.F	Peripherally Inserted Central Catheter Teaching Sheet - French

REFERENCES:

Adult Parenteral Monograph for Alteplase (Cathflo)

Pediatric Parenteral Monograph for Alteplase (Cathflo)

Extravasation Management of Non-Chemotherapeutic Medications https://www.southernhealth.ca/assets/documents-library/946956e464/Extravasation-Management-of-Non-Chemotherapeutic-Medications.pdf

CLI.6010.SG.003.SD.01 Extravasation List of Irritant Drugs

Canadian Vascular Access Association (CVAA) External Length Measurement Poster

Bldgood, Clare. (2016). Improving the Patient Experience with Real-Time PICC Placement Confirmation. *British Journal of Nursing.* Volume 25, No 10, 539-543.

Canadian Vascular Access Association (2019). *Canadian Vascular Access & Infusion Therapy Guidelines.*

Canadian Vascular Access Association (2019). Canadian Vascular Access & Infusion Therapy Guidelines. *CVAA Occlusion Management Guideline for Central Venous Access Devices CVADs),* Second Edition.

Health Sciences Center (2020). I*nfusionTherapy: Central, Peripheral, Subcutaneous, Intraosseous: Policy and Procedures.* Winnipeg.

Infusion Nurses Society (2021). Journal of Infusion Nursing. *Infusion Therapy Standards of Practice 8th Edition*, Volume 44, Number 1S. Lippincott.

Infusion Nurses Society (2021). *Policies and Procedures for Infusion Therapy: Acute Care,* 6th Edition. Lippincott.

Kristie Naayer, BD Vascular Access Specialist. Personal Communication. February 2023.

Pittiruti, M., et al. (2021). Intracavitary Electrocardiography for Tip Location DuringCentral Venous Catheterization: A Narrative Review of 70 Years of Clinical Studies. *The Journal of Vascular Access.* Volume 22(5) 778-785.

Appendix 1

Table 1-Administration Set Change Frequency by Administration Type

Administration Type	Administration Set	Set Change Frequency
Continuous	Primary and secondary sets	Every 4-7 days (unless otherwise stated in manufacturers'directions for use).
Intermittent	Primary and secondary sets	Every 24 hours
Hemodynamic and arterial pressure monitoring	Continuous	Every 4 days

Table 2-Administration Set Change Frequency by Infusate

Infusate	Administration Set	Set Change Frequency
Blood and blood components	Continuous or single unit	At end of 4 hours
Injectable lipid emulsions	Continuous or single dose	Every 12 hours or with each new container
Parenteral nutrition	Continuous with injectable lipid emulsions	Every 24 hours
	Continuous without injectable lipid emulsions	Every 24 hours
	Cyclic or intermittent delivery	Every 24 hours
Propofol	Continuous or single dose	At least every 6 to 12 hours

Appendix 2- Alteplase Administration

2.1 Using Single Syringe Method

Figure 1. Direct instillation of thrombolytic with a single 10 mL syringe with thrombolytic. Ensure the syringe containing the thrombolytic remains in an upright position to prevent air entry into the catheter and vasculature.

Source: Photo courtesy of F. Paquet. Used with permission.

2.2-Using 3-way Stopcock Method

Figure 2a. Three-way stopcock att ached to the occluded CVAD lumen with the two other ports att ached to (a) an empty, sterile 10 mL syringe, and (b) a 10 mL syringe with the thrombolytic.

Source: Photo courtesy of F. Paquet. Used with permission.

Figure 2b. Pull back on the empty 10 mL syringe to achieve the "vacuum" with the stopcock in OFF position to the thrombolytic.

Source: Photo courtesy of F. Paquet. Used with permission.

Figure 2c. Th e port to the thrombolytic is opened to allow for the "sucking in" of the medication toward the thrombus/clot burden causing the occlusion.
Source: Photo courtesy of F. Paquet. Used with permission.

2.3-Dual Syringe and Non-Coring IVAD Access Needle Method

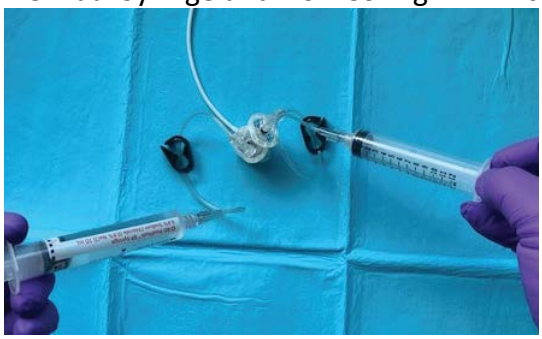


Figure 3a. Dual syringe method to alternate flushing and aspiration of IVAD.
Source: Photo courtesy of K. Naayer. Used with permission.

Figure 3b. Use different needle lengths to access port if needle footprint is too large to be side by side.
Source: Photo courtesy of F. Paquet. Used with permission.