



Nursing Practice Reference

Title: CENTRAL VENOUS ACCESS DEVICES (CVAD): CARE AND MAINTENANCE OF TUNNELED (T-CVAD) AND NON-TUNNELED (NT-CVAD) CATHETERS

Effective Date: February, 2016

Approved:

Sites:

All

AC

CN

CSI

FVC

VC

VIC

Other

Reason for Directive:

To provide guidelines for the care and maintenance of Central Venous Access Devices (CVADs), both:

- tunneled or long term (Hickman / Broviac) and
- non-tunneled, percutaneous, or short term.

These guidelines are used in conjunction with:

[PHSA Hand Hygiene Policy](#)

BCCA Infection Prevention and Control Manual

<H:\EVERYONE\Infection Control\BCCA Infection Prevention and Control Manual\BCCA Manual final -Dec 2015.pdf>

BCCA Infusion Therapy Education program for Registered Nurses -

<H:\EVERYONE\nursing\Provincial Nursing Orientation Program\2. Provincial Nursing Orientation\13. BCCA Infusion Therapy Education Program for Registered Nurses.doc>

I-490 IV therapy: Use of an Infusion Pump with Dose-error Reduction Software -

<H:\EVERYONE\nursing\REFERENCES AND GUIDELINES\BCCA Nursing Practice Reference Manual\I-490 IV Therapy - Use of Infusion Pump with Dose Error Reduction Software.pdf>

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

*cap = Neutral Displacement Needleless Connector

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

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

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

[H:\EVERYONE\nursing\EDUCATION](#) Central Venous Access Devices - Naturopathic Doctors:

- Central Venous Access Devices: Naturopathic Doctor Position Statement
[H:\EVERYONE\nursing\EDUCATION\Central Venous Access Devices - Naturopathic Doctors\Naturopathic Doctor Position Statement.docx](#)
- Patient handout: Naturopathic Doctor- Use of Central Venous Access Devices FAQ
[H:\EVERYONE\nursing\EDUCATION\Central Venous Access Devices - Naturopathic Doctors\Naturopathic Doctors - Central Venous Access Devices FAQs.docx](#)

Index	Page(s)
DIRECTIVES	
Clinical Competency Validation	4
Patient Education	4
Features: <i>Tunneled / Non-Tunneled, Single / multi-lumen, Valved / non-valved, Power Capable Devices</i>	4
Insertion/Removal: <i>Suture Removal</i>	5
Documentation and Reporting: <i>Type of CVAD, Care, PSLS</i>	5
Infection Prevention and Control: <i>Sterile Aseptic Technique, 3-swab-no-touch-technique, Catheter Site Assessment and Cleansing</i>	6
Dressings	7
Infusion Equipment	7
Preventing Air Embolism	8
Maintaining Patency: <i>Pulsatile and Positive Pressure technique</i>	8
CVAD Damage	9
PROCEDURES	
Routine Flush, Lock and Cap change	9
Initiating an Infusion	10
Completing an Infusion	11
Drawing Blood Specimens	12
Dressing Change	14
MANAGEMENT OF POTENTIAL CATHETER OCCLUSION – PARTIAL AND COMPLETE	15
Standard Trouble-Shooting Process	15
Management of an Occluded CVAD with Alteplase	16
Skin Patch Test	18
REFERENCES	19
APPENDIX A: Patient Information Handout	21

DIRECTIVES:**Clinical Competency Validation:**

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

Patient Education:

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

Features:

Tunneled (T-CVAD) vs Non - Tunneled (NT-CVAD) – see BCCA Infusion Therapy Education Program

Single or Multi-Lumen:

- Each lumen of a multi-lumen CVAD is treated as a separate catheter.
- Recommend that where possible, the largest (gauge) lumen be used for blood sampling, blood product administration, and administration of viscous or high volume fluids.

Valved:

- A valve is present near the distal tip of the catheter.
- Clamps will NOT be present on external portion of catheter.

Non-valved:

- The catheter is open at the distal tip.
- Requires clamping before entry into, or exit out of, the system.

Power Capable CVADs:

- Routine care according to the procedures in this document apply to power capable CVADs.
- No special care needs, unless they are being used for diagnostic purposes. Special tubing required to withstand the higher intraluminal pressures generated during power injection.

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

*cap = Neutral Displacement Needleless Connector

Insertion/Removal:

- T-CVADs and NT- CVADs must be inserted by a physician. The catheter tip is ideally located in the junction between the superior vena cava (SVC) and the right atrium. Confirmation of tip placement by X-ray or fluoroscopy is done at time of catheter insertion.
- In an emergency situation, confirmation of NT-CVAD placement by X-ray is waived.
- CVADs are usually removed by a physician when
 - Therapy is completed
 - The catheter is malpositioned
 - The tip is no longer within the SVC
 - The catheter is damaged
 - The patient has developed a catheter-related infection.

Sutures:

- **T-CVAD** - Sutures may be located at:
 - Vein entrance site (neck): Sutures may be dissolvable or non-dissolvable.
 - ✓ Dissolvable sutures are not visible on the skin: you will see a knot only.
 - ✓ Non-dissolvable sutures/staples are removed 7 days post T-CVAD insertion.
 - Exit Site (chest):
 - ✓ Suture is removed 14 days post T-CVAD insertion. Exception: If bruising is present, remove suture 14 days after bruising subsides. If patient is on steroids or has had recent radiation therapy to the chest, leave suture until physician orders suture removal (may be up to 4-6 weeks).
- **NT- CVAD** – sutures remain in situ for the lifetime of the catheter.

Documentation and Reporting:**Type of CVAD:**

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

Documentation of Care:

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

Patient Safety Learning System (PSLS):

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

Infection Prevention and Control:

- Perform hand hygiene per **PHSA Hand Hygiene Policy**.
- Plan nursing care to minimize access of the CVAD. Where possible all procedures, i.e. blood sampling, flushing, IV infusion, and connecting elastomeric infusors, should be done through the *cap to minimize opening the system.
- The work surface is cleaned with 70% alcohol or disinfecting towelettes intended for use in healthcare before preparing supplies for any CVAD procedure.
- **Sterile Aseptic Technique** will be use for all procedures. In sterile aseptic technique, sterile parts may only contact other sterile parts; contact between sterile and non-sterile parts must be avoided. When it is necessary to touch sterile parts, sterile gloves and procedure mask should be used (e.g., dressing change and managing the care of a damaged catheter).
- **Single unit** packages must be used.

Skin Preparation:

- Chlorhexidine Gluconate (CHG) solution 2% with 70% alcohol is the preferred antiseptis for CVAD site skin care. Allow at least 30 seconds drying time for maximum antiseptis and to reduce skin irritation.
- For patients with sensitivities to CHG 2% with 70% alcohol, CHG aqueous may be used instead. Allow to dry at least 2 minutes.
- For patients with sensitivities to CHG aqueous, povidone solution may be used: Allow to dry at least 2 minutes.

*cap = Neutral Displacement Needleless Connector

Connection Cleansing:

- To cleanse the connection between any CVAD tubing and IV tubing or *cap use the **3-swab-no-touch technique**:
 1. Grasp connection with one swab.
 2. Use second swab to clean from catheter connection up catheter for 10 cm.
 3. Use third swab to clean down IV tubing 10 cm. (Omit this step if catheter is capped).
 4. Cleanse connection site or *cap vigorously with the first alcohol swab. Discard swab.
 5. Do not drop the connection site once it is cleaned.
- If a CVAD is removed for suspected infection, the tip of the catheter must be placed in a sterile container and sent to the lab for C & S evaluation.
- Do **NOT** apply tape to any CVAD connections or junctions as the adhesive can harbour microorganisms.

Dressings:

- The gauze pressure dressing applied at time of insertion will be removed within 24 - 48 hours and replaced with a Transparent Semi-permeable Membrane (TSM) dressing.
- TSM dressings will be changed every 7 days and whenever wet, loose, non-occlusive, blood or drainage is present, or for further assessment if infection or inflammation is suspected.
- Gauze dressings may be used for those patients who cannot tolerate an occlusive dressing. Gauze dressings will be changed at least every 48 hours.
- Gauze is not routinely used beneath TSM dressings. If gauze is used, the dressing is then considered to be a gauze dressing and is changed every 48 hours.
- No dressing is needed for healed T- CVADs (3-6 weeks post insertion). *Exception: T-CVAD should be dressed while patient is hospitalized to prevent nosocomial infection.*

Infusion Equipment:

- Any solutions infusing into any CVAD will be changed every 24 hours (unless patient is an outpatient on a continuous infusion).
- All solutions will be infused through a pump. Exceptions: The administration of blood and blood products and when patients can be continually monitored during infusions that do not contain medications.

*cap = Neutral Displacement Needleless Connector

- All IV tubings will be changed every 96 hours, except for tubing used for intermittent infusions and lipid tubing which will be changed every 24 hours.
- The *cap; neutral displacement needless connector, which creates a closed intravenous system will remain attached to the CVAD at all times. The *cap should be discarded and replaced with a new *cap in the following circumstances:
 - *Cap is removed for any reason
 - Routine *cap change at least every 7 days
 - Blood or debris within the *cap
 - *Cap septum shows poor integrity from multiple use, cracks, leaks or other defects
 - Replacement of a positive or negative displacement cap.

Preventing Air Embolism:

- Luer-lock IV equipment will be used for **all** CVADs.
- Extension tubings will be clamped at all times when CVAD is not in use.
- Never use metal forceps to loosen a tight connection. Doing so may crack the connection putting the patient at risk for a damaged CVAD, air embolism, and infection.
- Only use clamps on the reinforced portion of the CVAD.

Maintaining Patency:

- All CVADs shall be flushed with 20 mL Normal Saline:
 - prior to each use to assess CVAD function,
 - after each use (blood draw or infusion) to clear the catheter of blood, and to prevent contact between incompatible medications,
 - in conjunction with weekly *cap and dressing changes.
- For **Valved** CVADs, Each lumen will be flushed with 20 ml Normal Saline **at least** every 7 days.
- For **Non-valved** CVADs, Each lumen will be flushed with 20 ml Normal Saline followed by 5 ml Heparin (10u/ml) lock **at least** every 7 days.
- Flush using a **pulsatile technique**. This technique removes built-up residue, medication, and fibrin from the walls of the catheter.
- **Positive Pressure Technique** is used to prevent back flow of blood into the tip of the catheter and subsequent clot formation. This is achieved by:
 - clamping the non-valved catheter while still injecting the last 0.5 ml of NS or Heparin lock solution, **or**

*cap = Neutral Displacement Needless Connector

- for valved catheters, keeping slight pressure on the plunger before disconnecting the NS syringe.
- To prevent rupture **NEVER** use excessive force when flushing. The smallest sized syringe that is safe for **DIRECT** connection is a 10 mL syringe.

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

CVAD Damage:

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

Signs of potential CVAD damage include:

- Small holes, cuts or tears to the external portion of the catheter
- Leaking or wetness under the dressing during infusion or flushing
- If the damage is under the skin there may be swelling or complaints of pain, discomfort or “fullness” along the track of a tunneled catheter.

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

- clamped proximally to damaged area, i.e. between the patient and the leak. Use an existing clamp or add a clamp.
- Alternatively, the catheter can be folded (between the patient and the leak) and sealed with an adhesive dressing, to prevent air embolism or bleeding from the device.
- Label the damaged catheter with “DO NOT USE” while waiting for removal to be performed.
- The goal to reinsert a new CVAD should be a collaborative decision among physician, nurse and patient based on patient factors and need for ongoing central vascular access.

PROCEDURES:

Routine Flush, Lock and Cap Change -

Supplies:

- Surface disinfectant
- Non-sterile gloves
- For each lumen:
 - 2-3 Alcohol or CHG 2% in 70% alcohol swabs
 - 1 x 20 ml syringe of Normal Saline
 - 1 x 10 ml syringe of 5 mL Heparin (10 units/mL) (for open-ended CVADs only)
 - *cap

*cap = Neutral Displacement Needleless Connector

Procedure:

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

Initiating an Infusion -**Supplies:**

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

Procedure:

1. Clean work surface. Perform hand hygiene. Don gloves.
2. Cleanse *cap surface with antiseptic swab, allow to dry.

*cap = Neutral Displacement Needleless Connector

3. Confirm CVAD patency with 20 mL Normal Saline syringe if not already done. Clamp line (if present).
4. Connect primed IV tubing to *cap.
5. Initiate infusion. Ensure that the solution flows to gravity, and that there is no swelling around CVAD.
6. Adjust IV or program infusion pump as ordered.
7. Secure tubing to patient's chest or gown with tape.
8. Remove gloves and perform hand hygiene.

Completing an Infusion -

Supplies:

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

Procedure:

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

*cap = Neutral Displacement Needleless Connector

Drawing Blood Specimens -

Supplies:

- Surface disinfectant
- Non-sterile gloves
- 1-4 Alcohol or CHG 2% in 70% alcohol swabs
- 2 x 20 ml syringes Normal Saline
- Vacutainer or needleless blood transfer device if using syringe method.
- Appropriate blood collection tubes or 10 mL syringes if using Syringe Method
- 1 x 6 mL tube for discard
- 1 x 10 ml syringe of 5 mL Heparin (10 units/mL) (for non-valved CVADs only)
- *cap (if need to change it)
- Sterile dead-end cap (if capping an infusion)

Procedure:

1. Clean work surface. Perform hand hygiene. Don gloves.
2. Ensure all CVAD lumens are clamped (if clamps are present) and infusions are stopped prior to obtaining blood samples. Where a CVAD has multiple lumens, the blood should be drawn from the larger / distal lumen.

Exception: *Single lumen catheter being used exclusively for TPN, in this case blood work should be collected peripherally.*

3. If no infusion is present, **proceed to step 6**. If an IV infusion is present, **proceed to steps 4**.
4. Cleanse the connection between the CVAD *cap and IV tubing using the **3-swab-no-touch technique**.
5. Disconnect the tubing from the *cap; place a dead-end cap on the IV tubing if it will be re-attached.
6. Cleanse *cap surface with antiseptic swab, allow to dry. Attach syringe of Normal Saline to CVAD *cap. Flush CVAD with 20 mls Normal Saline to prevent contamination of sample with infusate. Option: Pull back on plunger to obtain 5-6 mls of blood for discard sample. Discard syringe.

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

7. Luer lock the vacutainer onto *cap.

*cap = Neutral Displacement Needleless Connector

8. Obtain discard sample (UNLESS drawing blood cultures, or previously drawn via syringe). Press tube (5-6 mL) onto vacutainer needle, open clamp if clamp present, and allow tube to fill.
NB: If tube does not fill, proceed with *Standard Trouble Shooting Process*, may need to draw blood by *Syringe Method*.
9. Clamp tubing if clamps present. Remove tube and discard.
10. Repeat until all desired blood samples are obtained, clamping between samples. NB: In order to avoid contamination from substances in collection tubes. Draw the blood specimens in the order recommended by your Regional Laboratory Medicine Guidelines. [VCH-Blood Collection Quick Reference Guide](#).
11. Remove vacutainer and discard.
12. Connect syringe of Normal Saline to *cap, flush briskly using pulsatile and positive pressure techniques.
13. Disconnect syringe from *cap, and discard.
14. For non-valved CVADs only, inject Heparin lock solution through *cap. Discard syringe.
15. Go to next procedure, or remove gloves and perform hand hygiene.

Drawing Blood by Syringe Method - continuing from step 6 above

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

*cap = Neutral Displacement Needleless Connector

14. Go to next procedure, or remove gloves and perform hand hygiene.

Dressing Change -

Supplies:

- Surface disinfectant
- Procedure mask
- Non-sterile gloves
- Sterile gloves
- Sterile dressing tray
- 1-2 10 cm x 14 cm TSM dressing
- 5 x swabs or 3 x swabsticks, 2% CHG in 70% alcohol (or alternate solutions / pg 6)

Procedure:

1. Clean work surface. Perform hand hygiene.
2. Prepare sterile tray and supplies.
3. Don non-sterile gloves and procedure mask.
4. Remove dressing, beginning at CVAD hub and gently pulling the dressing toward the insertion site. Do not use alcohol to remove the dressing as it will disintegrate the dressing.
5. Remove and discard gloves.
6. Perform hand hygiene.
7. Don sterile gloves.
8. Assess integrity of skin beneath dressing.
9. Inspect the catheter site for redness, tenderness, swelling and drainage. If there is any sign of infection, swab the site for C&S and notify the physician.
10. Hold CVAD / lumens off skin with a dry 2 x 2 and forceps.
11. Cleanse exit site, skin around site, and catheter with swabs / swabsticks.
12. Starting at the exit site and working outwards, clean skin using gentle friction, back and forth motion, clean for at least 30 seconds and ensure that the prepped site will be the size of the dressing (approximately a 10 cm radius). Each time you return to the exit site, use a new swab or flip to unused side of swabstick. Allow to air dry completely.

*cap = Neutral Displacement Needleless Connector

- Gently remove any crusting. Soak crusting to allow for non-traumatic removal.
- Clean CVAD Catheter / lumens with swab pad – hold and “pinch/dab” down line being careful not to pull on the catheter.
- Allow to dry thoroughly.

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

13. Apply new dressing over site. Do not stretch the dressing tight. This can contribute to skin breakdown. Apply the dressing sealing from the inside to the outer edges in a relaxed manner.
14. Remove gloves and perform hand hygiene.

MANAGEMENT OF POTENTIAL CATHETER OCCLUSION – PARTIAL AND COMPLETE:

Standard Trouble Shooting Process -

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

If unable to aspirate blood from CVAD:

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

Partial Occlusion:

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

Complete Occlusion:

- The line is completely occluded if the Standard Trouble-Shooting Process has been applied but can **neither infuse fluids nor aspirate blood.**

*cap = Neutral Displacement Needleless Connector

- If there is resistance to injection, STOP. To prevent rupture NEVER use excessive force when attempting to flush CVADs.

Occlusion in a Multi-lumen CVAD:

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

Management of an Occluded CVAD with Alteplase -

CVADs occluded for >24 hours increase the patient's risk of infection, treat occluded CVAD as soon as possible.

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

Supplies:

- Surface disinfectant
- Non-sterile gloves
- Alcohol or CHG swabs (2% CGH in 70% alcohol)
- For each occluded lumen:
 - 1 x 20 ml syringe Normal Saline
 - 2 mg alteplase in 2 mL (in a 10 mL syringe)
 - *cap.
 - 1 x 10 ml syringe of 5 mls Heparin lock solution (for non-valved CVADs to be capped)

Procedure:

1. Clean work surface. Perform hand hygiene and don gloves.
2. Scrub surface of *cap with cleansing swab. Or scrub connection and remove *cap if suspected factor in occlusion.
3. Attach 20 ml syringe Normal Saline.
4. Pull back on syringe to assess for blood return.
5. If blood return **is** spontaneous, there is no need for Alteplase – carry on with procedures.
6. If blood return **is not** spontaneous, clamp CVAD, remove syringe.

*cap = Neutral Displacement Needleless Connector

7. Attach 10 mL syringe with 2 mg/2 mL Alteplase.
8. For **partial occlusion** instill 2mg (in 2 mL) Alteplase to CVAD; clamp the line.
9. For **complete occlusion** instill 2 mg (in 2 mL) Alteplase using a gentle push-pull action:
 - Keeping the syringe upright (plunger at the top and CVAD-syringe connection below), pull plunger back by 2 mL and release slowly.
 - Repeat several times to let Alteplase reach thrombotic occlusion; clamp the line once full dose of Alteplase has been instilled.
 - **Do not** use excessive force to inject Alteplase.
10. Discard syringe and add *cap if not already present.
11. Apply label to line “DO NOT USE” with time of instillation (e.g. Alteplase @ 10:00).
12. Allow Alteplase to remain in catheter for **30-120 minutes**.

NB: *It is safe for Alteplase to remain in the line for 24-72 hours if check cannot be performed after 120 minutes.*

After 30 – 120 Minutes:

Supplies:

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

Procedure:

13. Clean work surface. Perform hand hygiene and don gloves.
14. Scrub *cap with cleansing swab.
15. Attach 20 ml syringe of 10 mls Normal Saline.
16. Pull back on syringe to assess for blood return.

*cap = Neutral Displacement Needleless Connector

17. If blood return **is spontaneous**, withdraw 5 mL blood and discard. Use 2nd saline syringe to flush with 20 mL Normal Saline and carry on with other procedures.
18. If blood return is **NOT** spontaneous, after 30 minutes, allow the same Alteplase dose to remain in the line.
19. After a total of 120 minutes Alteplase dwell time **REPEAT steps 13-18**.
20. If blood return is not spontaneous after 120 minutes, obtain 2nd syringe of Alteplase and **REPEAT** the Alteplase procedure.

NB: If the lumen is still occluded after 2 attempts at using Alteplase, Refer to BCCA ST Policy III-80.

Skin Patch Test -

- When the skin around the insertion site becomes itchy and/or reddened under the dressing do a patch test on the patient's chest. This will distinguish between sensitivity to alcohol, CHG, **and/ or** TSM dressing. Apply:
 - 70% alcohol on one patch
 - aqueous CHG 2% on a 2nd patch, and
 - TSM dressing on a 3rd patch.
- Check site in 24 hours.
- If the patient is sensitive to alcohol, then switch cleansing solution to aqueous CHG 2%.
- If the patient is sensitive to CHG, change the cleansing solution to povidone iodine.
- If the patient is sensitive to the TSM dressing, change the dressing to alternate TSM. If unable to tolerate any TSM dressings, change to gauze dressing.
- If the skin becomes irritated, cleanse with appropriate agent, apply a no-sting barrier, and make the dressing over the insertion site as small as possible. Consider dressing with gauze and cling, or no dressing in the case of a well healed T-CVAD (3-6weeks post insertion.)

REFERENCES:

Camp-Sorrell, D. (2010) State of the Science of Oncology Vascular Access Devices. *Seminars in Oncology Nursing*, Vol 26, No 2 (May), 2010: pp. 80-87.

Canadian Vascular Access Association (2013). Occlusion management guideline for central vascular access device. *Journal of Canadian Vascular Access Association* 7(1), 1-36 36p. <http://cvaas.info/>.

Goossens, G. A. (2015). Flushing and locking of venous catheters: available evidence and evidence deficit. *Nursing Research and Practice*. 2015, 12p.
<http://dx.doi.org/10.1155/2015/985686>

<https://www.cookmedical.com/search/#q=central+venous+catheters&type=products>

<https://www.bardaccess.com/>

Infusion Nurses Society. (2011). Infusion Nursing Standards of Practice. *Journal of Intravenous Nursing*, Supplement. 34(1S).

Infusion Nurses Society. (2011). Policies and Procedures for Infusing Nursing. 4th ed.

The Joint Commission (2012). Preventing central line–associated bloodstream infections: A global challenge, a global perspective. Oak Brook, IL: Joint Commission Resources, May 2012. Retrieved from
http://www.jointcommission.org/assets/1/18/CLABSI_Monograph.pdf

Macklin, D. (2010) Catheter Management. *Seminars in Oncology Nursing*, Vol. 26, No 2 (May) 2010:pp 113-120.

O’Grady, N.P., Alexandrer,M., Burns, L.A., Delinger, E. P., Garland, J., Heard, S.O., ... & the Healthcare Infection Control Practices Advisory Committee (HICPAC). (2011). Guidelines for the prevention of intravascular catheter-related infections. *Clinical Infectious Diseases*. 52(9), 1087-1099 13p.

Oncology Nursing Society. (2011). Access Device Guidelines - Recommendations for Nursing Practice and Education. 3rd ed.

PHSA Hand Hygiene Policy No. AS 160, [Hand Hygiene.pdf](#)

Perry, A. and Potter, P.A. (2014). *Clinical Nursing Skills and Techniques*. (8th ed.). Elsevier: Mosby

*cap = Neutral Displacement Needleless Connector

RNAO (2005). Nursing Best Practice Guideline – Care and Maintenance to Reduce Vascular Access Complications.

RNAO (2008). Nursing Best Practice Guideline – Care and Maintenance to Reduce Vascular Access Complications (Supplement).

Safer Healthcare Now (June 2012) Prevent Central Line Infections Getting Started Kit.
www.saferhealthcarenow.ca.

Schiffer, C.A.; Mangu, P.B.; Wade, J.C.; Camp-Sorell, D.; Cope, D.G.; El-Rayes, B.F.; Gorman, M.; Ligibel, J.; Mansfield, P. and Levine, M. (2013) Central Venous Catheter Care for the Patient with Cancer. American Society of Clinical Oncology Clinical Practice Guideline, Journal of Clinical Oncology. Volume 31, Number 10m, April 1 2013, pp. 1357-1370.

Vancouver Coastal Health (2010). Tunneled Central Venous Catheter(T-CVC) Single and Multilumen - OpenEnded (Hickman™): Basic Care and Maintenance Adult VCH – T- 1000. Accessed October 15, 2015

Vancouver Coastal Health (2004). Self Care Instructions for Hickman Line Catheter

X.- Qiu., Guo, Y., Hong-bin, F., Shao, J., & Zhang, X. (2014). Incidence, risk factors and clinical outcomes of peripherally inserted central catheter spontaneous dislodgement in oncology patients: A prospective cohort study. *International Journal of Nursing Studies*, 51: 955–963.

Developed By: Nancy Runzer, Clinical Instructor – VC

Revised By: Arlyn Heywood, Education Resource Nurse, 5th Floor - VC
Brenda Ross, Education Resource Nurse - VC

Reviewed By: Siby Thomas, Education Resource Nurse – AC/FVC
Mary Beth Rawling, Clinical Nurse Coordinator - CN
Andrea Knox, Education Resource Nurse - CSI
Jennifer Larssen, Education Resource Nurse – AC/FVC

Unit of Origin: Professional Practice Leaders, Nursing

APPENDIX A:

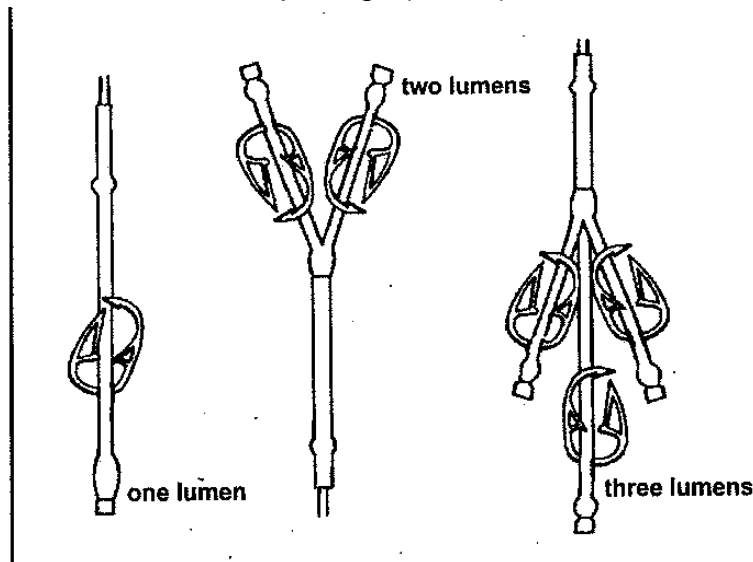
**Patient Information Handout
CENTRAL VENOUS ACCESS DEVICE (CVAD)**

Introduction:

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

What is a Central Venous Access Device (CVAD?)

The CVAD is a hollow flexible tube made of soft silicone or polyurethane material. The CVD may have one, two, or three openings (lumen) at the end of it.

**How is the CVAD inserted?**

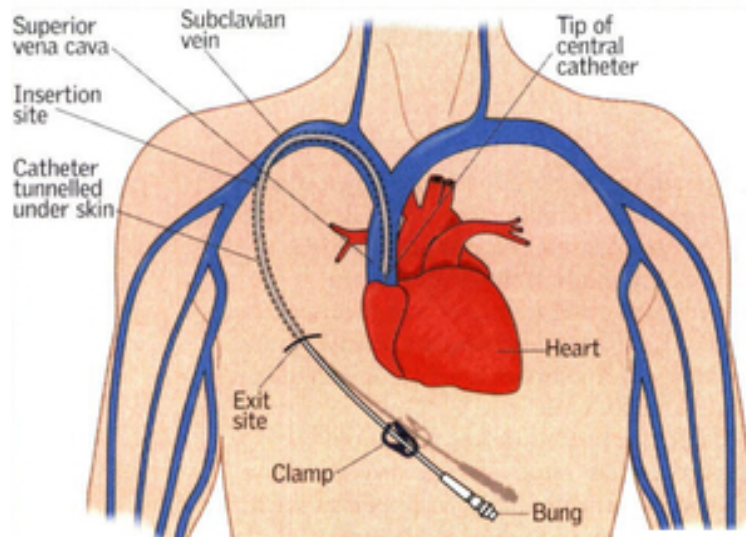
A special doctor (surgeon or radiologist) will insert your catheter. You will go to the Operating Room or a procedure room to have it put in. Either a general anaesthetic (you are asleep) or local freezing will be used.

Two incisions are made. One incision is made in your upper chest or neck and is called the insertion site. This is where the CVAD is put into a vein. The end of the CVAD is

*cap = Neutral Displacement Needleless Connector

placed in the large vein above the heart. A second incision is made in your lower chest and is called the exit site. This is the place where the CVAD exits your lower chest. A tunnel is made under your skin from the insertion site to the exit site. The CVAD is pulled up through the tunnel and is then put into a vein.

An x-ray is taken to make sure the CVAD is in the proper place. The incisions are stitched and bandages applied. This procedure takes about one hour to complete.



What happens after the CVAD has been inserted?

You will be observed in the recovery room for approximately one hour. If you have stitches they will be removed between 7-14 days after insertion. Sometimes the surgeon will use stitches that are absorbed by your body and they do not need to be removed. You will be informed of the type of stitches you have.

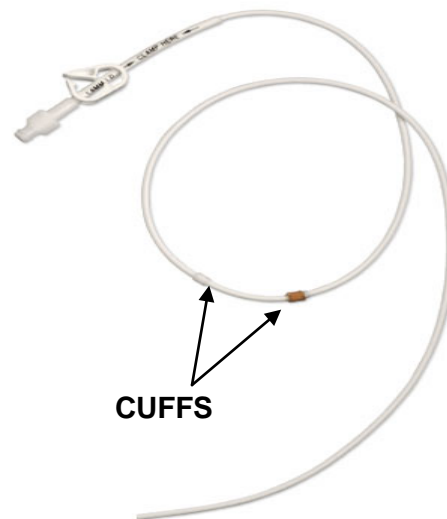
Some discomfort immediately following surgery is expected; it is often described as a stiff neck or bruised feeling. The discomfort usually lasts no more than 3 days. You will be instructed on what pain medications to take at home, if needed. The medication works best if it is taken when you first notice any discomfort and taken regularly as advised during the first 1-2 days. If your pain is not controlled by this medication, contact the physician for further instructions.

You may feel a small bump under the skin on your chest. This is called the Dacron cuff which holds the CVAD in place. There is also a smaller cuff that helps to stop bacteria from entering your system.

*cap = Neutral Displacement Needleless Connector

If you experience any of the following problems at home please call _____ or 911 or go to your closest emergency.

- Difficulty breathing
- Chest pain other than at the incision site(s)
- Fever/ chills
- Continuous nausea and vomiting
- Increased drainage from the incision site(s)
- Increase pain, swelling or warmth at the incision site(s)



Routine care of the CVAD:

The CVAD must be flushed with a special solution following use and a minimum of every 7 days. If you are not receiving treatment for a period of time, be sure to make arrangements to have a weekly flush as well as a dressing and Cap change. Your nurse can provide you with the information you need to get this done.

Common Questions:

Can I bathe or swim?

You can bathe after the CVAD is inserted. Be sure to keep the CVAD above the water and keep the dressings covered and dry. You will not be able to swim while your CVAD is in place.

Will the CVAD affect my normal daily activities?

Try to avoid strenuous activities or heavy lifting for the first few days after the CVAD insertion. Once your incision has healed, you should be able to return to your normal daily activities.

How long can the CVAD stay in place?

The CVAD is designed to stay in place for a long time. Each patient situation is different. The answer depends on how long you need it, how well the CVAD is cared for and your general health. Some people have had a CVAD for months without any problems. Your physician can discuss this further.

Will having the CVAD affect my sex life?

Having the CVAD in place will not interfere with your ability to be intimate with your partner. Please discuss any concerns with your nurse or doctor.

If I forget to have my CVAD flushed weekly what should I do?

You should make an appointment at you cancer centre to have your CVAD flushed as soon as possible.

What happens if I no longer need the CVAD?

In discussion with your doctor, it may be decided that you no longer need the CVAD. If so; you can arrange to have it removed by a physician at your cancer center.

If blood backs up into the CVAD is something wrong?

If you are using a clear cap, you may notice blood in the cap. This will not hurt you, but it can cause the growth of bacteria and increase the risk of infection or clotting. Blood usually backs up into the CVAD only when there is an increase in internal pressure created by some form of physical activity or bending over. If blood is noticed, make an appointment at you cancer centre to have your CVAD flushed as soon as possible. If your CVAD has clamps, keep the clamps closed.

What do I do if my clamp breaks?

Bend the catheter in half and wrap a rubber band around it as a temporary measure. A CVAD clamp should be obtained as soon as possible. PLEASE BE CAREFUL NOT TO DAMAGE THE CVAD.

Should someone else learn to care for my CVAD?

Having another person available who has been trained to care for you CVAD is important. This person can assist you if needed. The most important thing is that someone else knows what to do in an emergency situation.

I have heard that some chemicals can hurt the CVAD. Is this true?

It is important not to use anything on the CVAD other than the supplies in your kit. Nail polish remover and tape removers are especially harmful and must not be used.

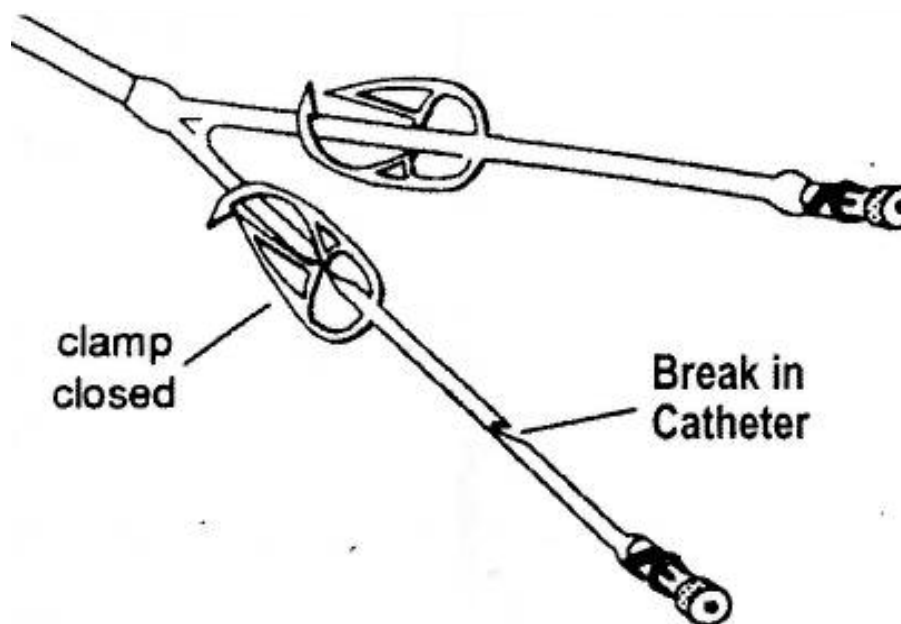
*cap = Neutral Displacement Needleless Connector

What problems should I look out for?

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

Problem	What you will see or feel	What to do	How to avoid it
INFECTION	You may have: <ul style="list-style-type: none"> • fever or chills • temperature above 38° C (101° F) • flu-like feeling, lack of energy • redness, swelling and / or drainage at incision 	<ul style="list-style-type: none"> • Phone doctor or emergency numbers provided: • antibiotics or other treatments may be ordered 	<ul style="list-style-type: none"> • Wash hands prior to beginning any CVAD care
THROMBO-EMBOLISM (breaking off of a blood clot from inside the device)	you may have: <ul style="list-style-type: none"> • shortness of breath • Severe pain under your collarbone that does not go away • dizziness or confusion 	<ul style="list-style-type: none"> • this is an emergency • lie down on your left side • call an ambulance (911) and go to the nearest Emergency Department 	<ul style="list-style-type: none"> • Make sure your CVAD is flushed every 7 days
LOOSE OR DISCONNECTED CAP	<ul style="list-style-type: none"> • The cap will either be loose or disconnected 	<ul style="list-style-type: none"> • If your CVAD has clamps ensure CVAD is clamped • Change cap and flush catheter 	<ul style="list-style-type: none"> • Always secure CVAD to clothing or skin • Avoid tugging or pulling at CVAD

Problem	What you will see or feel	What to do	How to avoid it
BREAK IN CVAD	<ul style="list-style-type: none"> The CVAD is leaking 	<ul style="list-style-type: none"> CLAMP CVAD IMMEDIATELY Clamp CVAD above site of leak or break or fold CVAD (diagram below table) Wrap broken area with sterile gauze and secure with tape Inform nurse or doctor The catheter will need to be repaired or removed 	<ul style="list-style-type: none"> Only clamp over reinforced clamping sleeve Rotate the sport where you clamp Never use scissors near the CVAD Do not insert needles into CVAD Carry an extra clamp at all times to use in case the break is between you and the CVAD clamp



Problem	What you will see or feel	What to do	How to avoid it
AIR IN THE CVAD	<ul style="list-style-type: none"> • You may have shortness of breath or chest pain 	<ul style="list-style-type: none"> • This is an EMERGENCY • CLAMP the CVAD immediately above site of leak or break if present or fold • Suspect the CVAD has been damaged • Lie down on your left side • Inform nurse or doctor • If you are feeling ill, call an ambulance and go to the nearest Emergency Department 	<ul style="list-style-type: none"> • Always clamp the CVAD before removing the cap • Carry an extra clamp at all times to use in case the CVAD clamp breaks
ACCIDENTAL REMOVAL OF CVAD	<ul style="list-style-type: none"> • CVAD partly or completely dislodged • CVAD out further than usual • Discomfort when flushing CVAD 	<ul style="list-style-type: none"> • Apply pressure over incision site for 5 minutes or until bleeding stops (see diagram below) • Inform nurse or doctor 	<ul style="list-style-type: none"> • Always secure CVAD to clothing or skin • Avoid tugging or pulling CVAD