

## Tunneled Central Venous Catheter (T-CVC) – Basic Care and Maintenance (Adult)

Valved (Groshong™) or Non-Valved (Hickman™, PowerLine™)

**Not Applicable for Hemodialysis/Apheresis CVC. See Hospital Specific Guidelines**

### Site Applicability

All VCH & PHC Acute and Community

### Practice Level

- RN, LPN
- RPN (SPH Only)

**See site specific Practice Level/Education Requirements:**

- **PHC** (see [Appendix A](#))
- **VCH** (see [Appendix B](#))

### Policy Statement

1. The recommended optimal T-CVC tip position is the distal (lower third) superior vena cava (SVC) or the cavo-atrial junction (CAJ) or Right Atrial Junction (RAJ).
2. The T-CVC may be used AFTER initial tip position confirmation by a Physician/Designate.
3. Catheter tip position is documented in the patient's health record.
4. For T-CVCs not inserted at your acute care facility and without documentation on admission, prior to use:
  - Catheter tip confirmation is **required** by Chest X-Ray (CXR)
  - Catheter patency **must** be verified by flushing and aspiration with blood return noted without resistance or complication.
  - Site assessment **must** be done to ensure the cuff of a T-CVC is not visible.
5. Review necessity of line daily and ensure prompt removal of unnecessary lines.
6. Assess the exit site (chest) daily for signs and symptoms of complication.
7. A dedicated lumen for TPN is recommended.
8. Power injectable catheters are labeled by the manufacturer as power injectable, with the maximum rate of power injection in millilitres (mL)/second.
9. DO NOT POWER INJECT INTO A CATHETER NOT LABELED AS POWER INJECTABLE.
10. A pump is recommended for infusions via T-CVC. For blood products, refer to transfusion guidelines: **[See Blood Components / Products: Administration \[D-00-12-30223\]](#)**.
  - **No minimum rate is recommended for continuous infusion via pump.**
  - **For infusions not via pump (i.e. gravity) minimum rate must be 50 mL/hour.**
11. 10 mL is the smallest-sized syringe to be used for flushing a T-CVC.
12. A non-toothed forceps must accompany the patient with a non-valved T-CVC at all times. In the event of a damaged/broken T-CVC, catheter is clamped between the area of damage/break and the chest site with forceps to prevent air embolus or hemorrhage. See [Appendix C](#).
13. A needleless connector is required on each lumen hub of a T-CVC.
14. A non-valved T-CVC is clamped (with built-in clamp on catheter lumen) when not in use.
15. If the built-in clamp breaks, attach extension tubing with a clamp. Use a non-toothed forceps on the extension leg of the T-CVC to occlude the catheter lumen when adding/changing the extension tubing.
16. Some manufacturers (e.g. Hickman™) have a reinforced area, labeled 'clamp here', to indicate where the T-CVC is to be clamped.
17. Aseptic technique is maintained throughout all T-CVC care and maintenance procedures.
18. Removal of a T-CVC is done by a physician with specialized knowledge.

## Need to Know

- Each lumen is an independent lumen.
- T-CVC may be:
  - Valved (flushed with saline only) or
  - Non-valved with clamp:
    - Inpatients in Acute Care:
      - Flush with normal saline (NS) 20 mL every 12 hours when not in use.
    - Outpatients and Acute Care Patients on day of Discharge:
      - Flush with NS 20 mL
      - Lock with 3mL Heparin 10 units/mL or 100 units/mL and weekly when not in use
  - Valved T-CVCs may have a
    - Proximal (external in the hub) valve or
    - Distal (internal at the tip) valve.
- T-CVC is tunneled under the skin and is considered a long-term CVC for multiple IV therapies that may stay in for years and is used in hospital or at home.
- T-CVC is inserted by a Radiologist or Vascular/General Surgeon in a specialty care area.
- T-CVC tip placement is done under fluoroscopy at time of insertion.
- T-CVC has a vein entrance site (neck) and catheter exit site (chest).
- T-CVC comes with a cuff attached, the cuff is placed in the tunnel and tissue grows into the cuff eventually securing the catheter in place.
- **Administration of phenytoin through a T-CVC may precipitate and block the T-CVC.**  
Consult Infusion Program Clinician/IV Educator prior to dedicating one lumen for phenytoin from time of insertion.
- Central Venous Pressure Monitoring: CVP monitoring – verify with catheter Instructions for Use (IFU) or consult Infusion Program Clinician/IV Educator.
- For Flow Rates and Priming Volumes: refer to manufacturer and/or Infusion Program Clinician/IV Educator.
- Management of Complications - see [Appendix C](#).

Patient education and information material for T-CVCs is given to the patient/patient's family after a T-CVC is inserted (see [Patient Education](#)).

Pictures of T-CVCs:

### Tunneled Valved (Groshong®)

Available as Single or Dual Lumen  
valved (distal)  
Saline only flushing required



### Tunneled Non-Valved (Hickman™)

Non-Valved with clamp, not power injectable  
Available as Single, Dual, Triple lumen  
Lock each capped lumen with 3 mL of Heparin solution 10 or  
100 units/mL  
Dacron cuff promotes tissue growth to secure catheter



### Tunneled Non-Valved (PowerLine™)

Power Injectable  
Non-Valved; with clamp  
Lock capped lumens with 3 mL of heparin solution 10 or 100  
units/mL  
Dacron cuff promotes tissue growth to secure catheter



**Note:** This is a **controlled** document for VCH & PHC internal use. Any documents appearing in paper form should always be checked against the electronic version prior to use. The electronic version is always the current version.

## Procedure

### [Procedure Resource Videos](#)

#### Part 1: [Site Assessment](#)

#### Part 2: [Post Insertion Care and Suture/Staple Removal](#)

#### Part 3: [Needleless Connector Use](#)

##### A: [Flushing](#)

##### B: [Needleless Connector Change](#)

##### C: [Initiating an Infusion through an Unused Lumen](#)

##### D: [Discontinuing a Continuous Infusion from a Capped Lumen](#)

#### Part 4: [Tubing Change](#)

#### Part 5: [Dressing Change](#)

#### Part 6: [Obtaining Blood Samples](#)

#### Appendix C: [Management of Complications for Tunneled-CVC](#)

#### Appendix D: [Checklists](#)

- [Dressing change for a Tunneled CVC](#)
- [Obtaining blood sample from a CVC: Vacutainer method](#)
- [Obtaining blood sample from a CVC: Syringe method](#)

#### Appendix E: [CVC Quick Reference](#)

## Part 1: Site Assessment

### Policy Statement:

1. T-CVCs are assessed at the beginning of each shift and PRN.
2. If a cuff is seen at the exit site of the catheter, this indicates the catheter has been pulled. It is not normal for the cuff to be visible at the exit site. Notify responsible physician and arrange for a CXR to confirm tip placement if the cuff is visible. Do not use the catheter until tip placement is confirmed. Refer to [Appendix C #10](#).

### Procedure:

#### Assessment:

1. Line placement:
  - a. Ensure the cuff on the catheter is NOT visible at the exit site.
  - b. If the CVC was inserted less than 3 to 4 weeks ago, ensure the suture at the exit site is intact and supporting the catheter to the skin. Ensure the suture is not infected on the skin.
  - c. Ensure all connections are secured.
  - d. Unused lumens are clamped if non-valved T-CVC. (Hickman™ unused lumens are clamped on reinforced area, labeled with writing 'clamp here')
2. Dressing:
  - a. Ensure dressing is dry, intact and dated.
3. Infection:
  - a. Exit site and tunnel for redness, edema, tenderness or discharge.
  - b. Assess patient for signs and symptoms of systemic infection.
4. Phlebitis:
  - a. Assess vein pathway for redness, tenderness, swelling, warmth or hardness along the vein in the chest and neck area (insertion site is usually at the neck).
5. Thrombus:
  - a. Assess color, warmth, sensation, movement, or edema of T-CVC site/side and compare to opposite site/side.
  - b. Visible collateral chest/facial veins, neck swelling and redness.

## Part 2: Post Insertion Care and Suture/Staple Removal

### Policy Statement:

1. The first dressing change must be done 24 hours post insertion.
2. Monitor both vein entrance site (neck) and exit site (chest) for complications.
3. The T-CVC may be used AFTER initial tip position is confirmed by Physician/Designate.

### Vein Entrance Site (neck):

- Remove initial dressing
- Apply new sterile gauze dressing until site healed; replace every 48 hours and PRN if wet or loose.
- 1. Vein Entrance Site closed with sutures:
  - Sutures may be dissolvable or non-dissolvable.
  - **Dissolvable sutures** are not visible on the skin
  - **Non Dissolvable** sutures/staples are removed as per this policy, **7 to 8 days** post T-CVC insertion, unless otherwise ordered by physician.
- 2. Vein Entrance Site closed with steri-strips:
  - Leave steri-strips in place until they fall off.

### Exit Site (chest):

- Remove initial dressing
- Transparent, semi-permeable dressing is changed every 7 to 8 days and as needed when loose, or if moisture, drainage, blood or signs and symptoms of site infection are present.
- If unable to apply transparent dressing, use a sterile gauze dressing; change every 48 hours and PRN if wet or loose.
- **Exit site sutures are removed as per this policy 3 to 4 weeks post T-CVC insertion, unless otherwise ordered by physician.**
- **Exception:** 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 to 6 weeks).
- Use extreme caution with scissors while removing sutures; contact Infusion Program Educator/IV Clinician if sutures are "tight".

## Part 3: Needleless Connector Use

### Policy Statement:

1. T-CVC lumen(s) are attached to a sterile needleless connector that is used to access the T-CVC in order to maintain a closed system.
2. Access needleless connectors with luer-lock connection only. **Do not use a needle or cannula to access needleless connector.**
3. 10 mL is the smallest-sized syringe used for flushing T-CVCs for routine care and maintenance.
4. Replace needleless connector:
  - a. Every 7 to 8 days (with dressing change);
  - b. PRN if contamination or complication noted.
5. Access lumens using aseptic technique.
6. IV direct medication may be given into a capped T-CVC lumen through a needleless connector. **Exception:** Leukemia/BMT patients.
7. To decrease risk of catheter related infection, avoid accessing the line more than 4 to 6 times in a 24 hour period (i.e. for intermittent medications more frequently than every 6h). Obtain an order for continuous infusion.

### A) Flushing

Valved	Non-valved (clamps attached)
<ul style="list-style-type: none"> <li>• Flush with NS 20 mL (pre and post access)</li> <li>• No heparin lock required</li> <li>• Flush and lock weekly with NS if T-CVC is not in use</li> </ul>	<ul style="list-style-type: none"> <li>• Inpatients in Acute Care Flush with NS 20mL: <ul style="list-style-type: none"> <li>○ Pre and Post access</li> <li>○ Every 12 hours when not in use.</li> </ul> </li> <li>• Acute Care Patients on Day of Discharge: <ul style="list-style-type: none"> <li>○ Flush with NS 20mL</li> <li>○ Lock with 3mL Heparin 10 units/mL or 100 units/mL</li> </ul> </li> <li>• Outpatients: <ul style="list-style-type: none"> <li>○ Flush before each use with NS 20 mL</li> <li>○ Flush after each use with NS 20 mL and lock with 3 mL Heparin 10 units/mL or 100 units/mL weekly when not in use.</li> <li>○ Maximum daily Heparin is 2000 units.</li> <li>○ If patient has heparin induced thrombocytopenia syndrome (HITS), contact IV/Infusion Program/Vascular Access Nurse Educator/ Clinician/ for direction</li> </ul> </li> </ul>

#### Equipment:

- Surface disinfectant
- Alcohol swabs, Large
- Non-sterile gloves
- Normal Saline (NS) 10 mL in pre-filled 10 mL syringe (20 mL per lumen)
- Heparin 10 units/mL or 100 units/mL pre-filled syringe for Outpatients and Acute Care patients on Day of Discharge with a T-CVC. (lock each lumen with 3 mL)

**Note:** pre-filled syringes with heparin are available in 3 mL or 5 mL volumes, take note of volumes and syringes required. Use concentration provided at your site for this procedure.

#### Procedure:

1. Clean work surface with surface disinfectant and let dry.
2. Wash hands thoroughly for 30 seconds.
3. Gather equipment.
4. Put on non-sterile gloves.
5. Scrub top of needleless connector with an alcohol swab using friction for 15 seconds.  
**ALLOW TO DRY COMPLETELY.**
6. Attach NS syringe to T-CVC lumen.
7. Flush with 1 to 2 mL NS before checking for patency. Patency is confirmed by aspirating until blood visible in mid catheter lumen or needleless connector. If unable to aspirate or resistance is felt, refer to **Troubleshooting Appendix C #4 Partial Occlusion**.
8. Flush each lumen with 20 mL NS using turbulent, stop start technique.
9. For Outpatients and Acute Care Patients on Day of Discharge with Non-Valved T-CVC lock with 3mL Heparin 10 units/mL or 100 units/mL using turbulent, stop start technique.
10. Remove syringe.
11. Clamp lumen if non-valved T-CVC.
12. Wipe top of needleless connector with alcohol swab to remove fluid residue.
13. Document procedure.

### B) Needleless Connector Change

**PHC uses sterile technique during dressing change and aseptic no touch technique for prn change without dressing change.**

### Equipment:

- Surface disinfectant
  - Non-sterile gloves
  - Alcohol swabs, Large
  - Sterile needleless connector
  - NS 10 mL in pre-filled 10 mL syringe (20 mL per lumen)
  - Heparin 10 units/mL or 100 units/mL in pre-filled syringe for Outpatients and Acute Care Patients on Day of Discharge with a non-valved T-CVC (lock each lumen with 3 mL)
- Note:** pre-filled syringes with heparin are available in 3 mL or 5 mL volumes, take note of volumes and syringes required. Use concentration provided at your site for this procedure.

### Procedure:

1. Clean work surface with surface disinfectant and let dry.
2. Wash hands thoroughly for 30 seconds.
3. Gather equipment.
4. Attach 10 mL pre filled NS syringe to needleless connector using no touch technique, prime cap, leave attached in package.
5. If non-valved T-CVC, clamp lumen.
6. Wash hands thoroughly using waterless hand sanitizer.
7. Put on non-sterile gloves.
8. Scrub catheter and needleless connector connection with an alcohol swab using friction for 15 seconds. **ALLOW TO DRY COMPLETELY.**
9. Remove old needleless connector.  
**Note:** if contaminants visible (dried blood/crystallization), use new alcohol wipe to scrub hub x15 seconds, being careful to prevent alcohol solution/contaminants from entering catheter. **ALLOW TO DRY COMPLETELY.**
10. Attach new needleless connector.
11. Unclamp non-valved T-CVC.
12. Flush with 1 to 2 mL NS before checking patency. Patency is confirmed by aspirating until blood visible in mid catheter lumen or needleless connector. If unable to aspirate blood, refer to **Troubleshooting Appendix C #4 Partial Occlusion**.
13. Flush with 20mL NS using turbulent, stop start technique.
14. For Outpatients and Acute Care Patients on Day of Discharge with Non-Valved T-CVC lock with 3 mL Heparin 10 units/mL or 100 units/mL using turbulent, stop start technique.
  - a. Remove syringe.
  - b. Clamp non-valved T-CVC.
  - c. Wipe top of needleless connector with alcohol swab to remove fluid residue.
15. For lumens with continuous infusion:
  - a. Attach IV infusion set into needleless connector.
  - b. Unclamp non-valved T-CVC.
  - c. Initiate infusion.
16. Document procedure.

### C) Initiating an Infusion through an Unused Lumen

#### Equipment:

- Surface disinfectant
- Alcohol swabs, Large
- Non-sterile gloves
- IV solution
- IV tubing
- NS 10 mL in pre-filled 10 mL syringe (20 mL per lumen)
- Pump
- Tubing change label



**Procedure:**

1. Clean work surface with surface disinfectant and let dry.
2. Wash hands thoroughly for 30 seconds.
3. Gather equipment.
4. Prime IV tubing.
5. Wash hands thoroughly using waterless hand sanitizer.
6. Put on non-sterile gloves.
7. Scrub top of needleless connector with an alcohol swab using friction for 15 seconds.  
**ALLOW TO DRY COMPLETELY.**
8. Attach 10 mL NS syringe.
9. Unclamp non-valved T-CVC.
10. Flush with 1 to 2 mL NS before checking for patency. Patency is confirmed by aspirating until blood visible in mid catheter lumen or needleless connector. If unable to aspirate blood, refer to **Troubleshooting Appendix C #4 [Partial Occlusion](#)**.
11. Flush with 20 mL NS using turbulent, stop start technique.
12. Connect IV tubing to needleless connector.
13. Initiate IV infusion.
14. Secure tubing.
15. Attach change label to the IV tubing.
16. Document procedure.

**D) Discontinuing an Infusion**
**Equipment:**

- Surface disinfectant
- Non-sterile gloves
- Alcohol swabs, Large
- Sterile dead end cap
- NS 10 mL in pre-filled 10 mL syringe (20 mL per lumen)
- Heparin 10 units/mL or 100 units/mL in pre-filled syringe for Outpatients and Acute Care Patients on Day of Discharge with non-valved T-CVC (lock each lumen with 3 mL)

**Note:** pre-filled syringes with heparin are available in 3 mL or 5 mL volumes, take note of volumes and syringes required. Use concentration provided at your site for this procedure.

**Procedure:**

1. Clean work surface with surface disinfectant and let dry.
2. Wash hands thoroughly for 30 seconds.
3. Gather equipment.
4. Stop IV infusion.
5. Wash hands thoroughly using waterless hand sanitizer.
6. Put on non-sterile gloves.
7. Disconnect IV tubing from needleless connector.
8. Cap IV tubing with sterile dead-end cap, if IV tubing will be re-connected for later infusion.
9. Scrub top of needleless connector with an alcohol swab using friction for 15 seconds.  
**ALLOW TO DRY COMPLETELY.**
10. Attach 10 mL NS syringe.
11. Flush with 1 to 2 mL NS before checking for patency. Patency is confirmed by aspirating until blood visible in mid catheter lumen or needleless connector. If unable to aspirate blood, refer to **Troubleshooting Appendix C #4 [Partial Occlusion](#)**.
12. Flush with 20mL NS using turbulent, stop start technique
13. For Outpatients and Acute Care Patients on Day of Discharge with Non-Valved T-CVC lock with 3 mL Heparin 10 units/mL or 100 units/mL using turbulent, stop start technique.
14. Remove syringe.
15. Clamp non-valved T-CVC.
16. Wipe top of needleless connector with alcohol swab to remove fluid residue.
17. Document procedure.

## Part 4: Tubing Change

### Policy Statement:

1. Luer-Lock IV tubing is used for all T-CVC infusions.
2. Do not transfer IV tubing from one venous access to another.
3. A pump is recommended for infusions via T-CVC. For blood products, refer to transfusion guidelines:  
**See [Blood Components / Products: Administration \[D-00-12-30223\]](#)**
  - a) **No minimum rate is recommended for continuous infusion via pump.**
  - b) **For infusions not via pump (i.e. gravity) minimum rate must be 50 mL/hour.**
4. It is recommended to prime IV tubing immediately prior to use.

### Tubing and Solution/Bag Change

	Tubing	IV Solution/Bag
<b>Primary/Secondary Tubing Set</b>		
Non-Medicated (Continuous) IV	every 96 hrs	when empty & with tubing change every 96 hrs
Medicated (Continuous) IV (incl. adds in primary bag)	every 96 hrs	every 24 hrs
Intermittent IV Infusion	every 24 hrs	with tubing change every 24 hrs
Blood and blood product infusion, see <b>VCH:</b> <a href="#">TM Blood Product Fact Sheets</a> <b>PHC:</b> <a href="#">Blood/Blood-Product Administration Procedure</a>		

<b>TPN Tubing Set</b>	
3:1 TPN: Lipids included <ul style="list-style-type: none"> <li>Filtered (1.2 micron) tubing</li> </ul>	See Parenteral Nutrition Document: <b>VCH:</b> <a href="#">Parenteral Nutrition: Care and Management</a> <b>PHC:</b> <a href="#">TPN: Total Parenteral Nutrition: Patient Care</a>
2:1 TPN: Lipids separate <ul style="list-style-type: none"> <li>Filtered (0.2 micron) tubing Dextrose/Amino Acid</li> <li>Lipid Tubing</li> </ul>	See Parenteral Nutrition Document: <b>VCH:</b> <a href="#">Parenteral Nutrition: Care and Management</a> <b>PHC:</b> <a href="#">TPN: Total Parenteral Nutrition: Patient Care</a>
TPN: Dextrose/Amino Acid only	See Parenteral Nutrition Document: <b>VCH:</b> <a href="#">Parenteral Nutrition: Care and Management</a> <b>PHC:</b> <a href="#">TPN: Total Parenteral Nutrition: Patient Care</a>
TPN: Intermittent	See Parenteral Nutrition Document: <b>VCH:</b> <a href="#">Parenteral Nutrition: Care and Management</a> <b>PHC:</b> <a href="#">TPN: Total Parenteral Nutrition: Patient Care</a>

### Equipment:

- Surface disinfectant
- Non-sterile gloves
- Alcohol swabs, Large
- NS 10 mL in pre-filled 10 mL syringe (20 mL per lumen)
- IV solution
- IV tubing
- Pump
- Tubing change label



**Procedure:**

1. Clean work surface with surface disinfectant and let dry.
2. Wash hands thoroughly for 30 seconds.
3. Gather equipment.
4. Prime tubing.
5. Stop infusion.
6. Wash hands thoroughly using waterless hand sanitizer.
7. Put on non-sterile gloves.
8. Disconnect IV tubing from needleless connector.
9. Scrub top of needleless connector with an alcohol swab using friction for 15 seconds. **ALLOW TO DRY COMPLETELY.**
10. Attach NS syringe.
11. Flush with 1 to 2 mL NS before checking for patency. Patency is confirmed by aspirating until blood visible in mid catheter lumen or needleless connector. If unable to aspirate blood, refer to **Troubleshooting Appendix C #4 [Partial Occlusion](#).**
12. Flush with 20 mL NS, using turbulent, stop start technique.
13. Remove syringe.
14. Wipe top of needleless connector with alcohol swab to remove fluid residue.
15. Connect new IV tubing to needleless connector.
16. Initiate IV infusion.
17. Secure tubing.
18. Attach change label to the IV tubing.
19. Document procedure.

## Part 5: Dressing Change

**Policy Statement:**

1. The T-CVC exit site must be assessed daily and with every dressing change (see [Site Assessment](#)).
2. For 3-4 weeks after insertion, T-CVC is secured by a suture at the exit site on the skin to support the catheter and ensure adequate tunneling into the subcutaneous tissue. See [Part 2: Post Insertion Care Suture/Staple Removal](#) for policy regarding suture/staple removal.
3. Transparent, semi-permeable dressing is changed every 7 to 8 days and as needed when loose, or if moisture, drainage, blood or signs or symptoms of infection are present.
4. A transparent semi-permeable Chlorhexidine (CHG) impregnated adhesive pad dressing or CHG impregnated sponge dressing may be used to reduce catheter related blood stream infections. Not to be used with CHG intolerance.
5. Sterile adhesive gauze dressing is used if
  - a. bleeding at the exit site
  - b. patient is diaphoretic
  - c. allergic to transparent dressing
6. Gauze dressing is changed every 48 hours and PRN when needed if loose, or if moisture, drainage, blood or signs or symptoms of infection are present.
7. Strict aseptic technique is required for dressing change procedure including dressing tray, procedure mask and sterile gloves.
8. Untinted Chlorhexidine Gluconate 2% (CHG) with 70% alcohol is used for skin cleansing.
9. CHG 2% without alcohol is to be used when skin irritation is related to an interaction between the adhesive in the dressing, and the alcohol of the prep.
10. Skin contact with CHG must:
  - a. be a minimum of 30 seconds in total
  - b. use friction in multiple directions
11. Povidone Iodine 10% is used as an alternative to CHG in cases of contact dermatitis or allergy. Do not wash off with saline as this will affect antimicrobial properties.
12. Saline is not recommended as cleaning agent for dressing change.
13. May use sterile normal saline to cleanse site if saturated in blood; follow with skin antiseptic.

14. CHG may be inactivated if used with normal saline. Ensure skin is completely dry prior to cleaning with CHG.
15. For skin irritation, see Infusion Program Clinician/IV Educator.

#### Equipment:


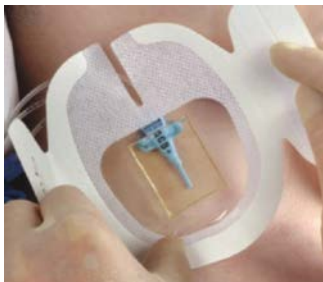
- Surface disinfectant
- Procedure Mask
- Non-sterile gloves
- Sterile gloves
- Dressing tray
- Sterile Dressing (choose type based on work site availability and skin condition):
  - Transparent semi-permeable (large or small size)
  - Transparent semi-permeable dressing with CHG impregnated pad
  - Transparent semi-permeable securement dressing
  - Transparent semi-permeable dressing and CHG impregnated sponge disc
  - Sterile adhesive gauze dressing
- 2 - CHG 2% with 70% alcohol – swab sticks
- 2-3 CHG 2% with 70% alcohol – large wipe
- Protective skin barrier for patients with sensitive skin
- If removing Transparent dressing with CHG-impregnated pad, include another antiseptic swab stick

#### Procedure:


1. Clean work surface with surface disinfectant and let dry.
2. Wash hands thoroughly for 30 seconds.
3. Gather equipment.
4. Put on mask
5. Wash hands thoroughly using waterless hand sanitizer.
6. Set up dressing tray.
7. Put on non-sterile gloves.
8. **Dressing removal:** follow instructions in table below based on product used.
9. Inspect the catheter site. If there are any signs of infection, swab the site for Culture and Sensitivity (C&S) and notify the physician.
10. Ensure the T-CVC catheter cuff is not visible at the catheter site. Notify physician immediately if cuff is visible, a CXR will be required.
11. Remove gloves.
12. Wash hands thoroughly using waterless hand sanitizer.
13. Put on sterile gloves.
14. **Clean catheter and exit site.**
  - a. Use first CHG wipe to clean catheter insertion site.
  - b. Anchor T-CVC at the catheter site with sterile forceps.
  - c. Wrap second CHG wipe around catheter. Clean the catheter moving in one direction away from the insertion site.
  - d. Clean all of the T-CVC that will be under the dressing.
15. Clean the catheter site, sutures (if present) and skin with CHG 2% with alcohol 70% swab stick.
  - a. Clean using friction in multiple directions for 15 seconds.
  - b. Repeat with second swab stick. Skin contact with cleanser must be for a minimum of 15 seconds per swab stick.
  - c. Ensure entire area that will be covered by dressing (approximately 10 x 10 cm) is cleansed.
16. **Allow skin to dry completely** to prevent skin irritation (minimum 3 minutes); increased dry time may be indicated for populations prone to skin irritation.
17. If required, apply skin prep, allow to dry completely.
18. Dressing application: follow instructions in table below based on product used.
 

**Note:** To prevent pulling, loop catheter under dressing or secure to clothing.
19. Label dressing with date and initials.
20. Remove gloves, mask, and wash hands thoroughly.
21. Document procedure.

**Note:** This is a **controlled** document for VCH & PHC internal use. Any documents appearing in paper form should always be checked against the electronic version prior to use. The electronic version is always the current version.

Type of Dressing	Removal	Application
<p>Securement Dressing (e.g. Tegaderm IV Advanced™)</p> 	<ol style="list-style-type: none"> <li>1. Remove tape strips applied to top of dressing. Allows for removal of dressing towards catheter site.</li> <li>2. Separate soft cloth border tabs where they meet under the catheter.</li> <li>3. Slowly peel dressing back over itself while stabilizing catheter.</li> <li>4. Remove entire dressing, peeling "low &amp; slow" to reduce medical adhesive skin injuries.</li> </ol>	<ol style="list-style-type: none"> <li>1. Position notched edge of dressing over catheter and slightly over lap soft cloth border tabs. Do not stretch dressing over skin. Skin will blister as dressing pulls back.</li> <li>2. Press transparent portion of dressing into place.</li> <li>3. While slowly peeling off paper frame, smooth dressing edges with fingertips. Smooth dressing from centre toward edges, using firm pressure.</li> <li>4. Remove sterile tape strip from paper frame. Optional - fold edge over itself, making a small tab for easier removal.</li> <li>5. Place wide strip underneath catheter, with notch facing towards the insertion site.</li> <li>6. Apply documentation label over top of dressing where catheter exits dressing. Include date of dressing change &amp; current external length.</li> <li>7. Apply firm pressure to entire dressing to ensure optimal adhesion. Pressure-sensitive adhesive conforms to skin and builds strength, securing catheter.</li> <li>8. Ensure: <ul style="list-style-type: none"> <li>• catheter site is visible near centre of dressing</li> <li>• catheter not twisted or kinked.</li> </ul> </li> <li>9. To prevent pulling, loop catheter under dressing or secure to clothing.</li> </ol>
<p>Securement Dressing with Chlorhexidine (CHG) gel pad (e.g. Tegaderm CHG™)</p> <p><b>MUST USE MOISTURE TO REMOVE</b></p> 	<ol style="list-style-type: none"> <li>1. Remove over/under tape strips if present; loosen edges of dressing.</li> <li>2. Secure catheter at exit site with finger on top of dressing.</li> <li>3. Pull dressing laterally (parallel to skin) to ease removal.</li> <li>4. Once CHG gel pad exposed, use swabstick to apply moisture between CHG pad and skin. DO NOT REMOVE WITHOUT MOISTURE.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure T-CVC exit site is secured under CHG gel pad.</li> <li>2. Catheter may be curved to fit under dressing.</li> <li>3. Smooth and press edges of dressing to adhere. Do not stretch dressing over skin – skin will blister as dressing pulls back.</li> <li>4. Ensure: <ul style="list-style-type: none"> <li>• catheter site visible near centre of dressing</li> <li>• catheter not twisted or kinked.</li> </ul> </li> <li>5. To prevent pulling, loop catheter under dressing or secure to clothing.</li> </ol>

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Type of Dressing	Removal	Application
<p>Tegaderm IV Advanced with Securacath™ in place. (Do not remove Securacath™ with dressing change, only change dressing).</p>	<p>The Securacath™ device is NOT removed with routine dressing changes.</p> <ol style="list-style-type: none"> <li>1. Remove tape strips applied to top of dressing. Allows for removal of dressing towards catheter site.</li> <li>2. Separate soft cloth border tabs where they meet under the catheter.</li> <li>3. Slowly peel dressing back over itself while stabilizing catheter/Securacath™.</li> <li>4. Remove entire dressing, peeling “low &amp; slow” to reduce medical adhesive skin injuries.</li> <li>5. Clean T-CVC site – the Securacath™ device can be ‘lifted’ off the skin for complete skin cleaning to insertion site and surrounding area.</li> </ol> 	<p>The Securacath™ device is NOT replaced with routine dressing changes.</p> <ol style="list-style-type: none"> <li>1. After skin is dry from skin cleaning, place Securacath™ device on skin without tension (let it ‘fall into place’ on skin)</li> <li>2. Position notched edge of dressing over catheter and slightly overlap soft cloth borders. Do not stretch dressing over skin. Skin will blister as dressing pulls back.</li> <li>3. Press transparent portion of dressing into place.</li> <li>4. While slowly peeling off paper frame, smooth dressing edges with fingertips. Smooth dressing from centre toward edges, using firm pressure.</li> <li>5. Remove sterile tape strip from paper frame. Optional – fold edge over itself, making a small tab for easier removal.</li> <li>6. Place wide strip underneath catheter, with notch facing towards the insertion site.</li> <li>7. Apply documentation label over top of dressing where catheter exits dressing. Include date of dressing change and current external length.</li> <li>8. Apply firm pressure to entire dressing to ensure optimal adhesion.</li> <li>9. Ensure: <ul style="list-style-type: none"> <li>• catheter site is visible near centre of dressing</li> <li>• catheter/Securacath™ not twisted or kinked</li> </ul> </li> </ol>

## Part 6: Obtaining Blood Sample

- [Obtaining Blood Samples from a Central Venous Catheter: Vacutainer Method Checklist](#)
- [Obtaining Blood Samples from a Central Venous Catheter: Syringe Method Checklist](#)

Specific labelling procedures for drawing **Group and Screen**, see

**VCH:** [Patient Identification, Specimen Collection and Labeling for Transfusion Medicine Investigation](#)

### Policy Statement:

1. Blood should not be drawn from a lumen used to infuse cyclosporine, tacrolimus or dextran.
2. If TPN is infused via a single lumen T-CVC, blood work is drawn peripherally if adequate peripheral access. Prior to using TPN lumen for blood work, consult Infusion Program Clinician/IV Educator.
3. Blood sampling can be done from all types of T-CVC – single, dual and triple lumens.
4. It is recommended that blood sampling be done through the needleless connector to ensure a closed-system.
5. For blood cultures: changing the needleless connector is recommended prior to obtaining blood sample.

6. For multi-lumen T-CVCs, use the largest lumen for blood samples.
  - a) If multi-lumen, stop infusions on other lumens and clamp during blood draw.
  - b) If other lumens (multi-lumen) are capped, **flush all** lumens after blood sampling.
7. A discard sample is taken prior to obtaining blood work. See:  
**VCH:** [Guidelines for Collecting Blood Samples through Vascular Access Device \(VAD\)](#)
8. Flush with a minimum of 20 mL NS post blood draw until needleless connector is clear (no blood visible in needleless connector).
  - a) For non-valved T-CVC, if continuing with IV infusion, do not lock with heparin.
  - b) If capping the lumen, follow the guidelines for heparin lock.
9. Blood sampling may be done using:
  - c) Vacutainer method (preferred).
  - d) Syringe method (using blood transfer device).

#### Equipment:

- Surface disinfectant
- Non-sterile gloves
- 4-5 alcohol swabs, Large
- Luer-lock Access Device, Holder with Pre-Attached Multiple Sample Adapter (vacutainer holder)
- Lab blood tubes
- Blood culture bottles \*if required – also new needleless connector (to be changed prior to blood sampling)
- Biohazard Sharps container
- Sterile dead end cap if reconnecting existing IV tubing
- 3-7 NS 10 mL in pre-filled 10 mL syringe (20 mL per capped lumen)
- Heparin 10 units/mL or 100 mL units/mL in pre-filled syringes for Outpatients and Acute Care Patients on Day of Discharge with a non-valved T-CVC(lock each lumen with 3 mL)  
**Note:** pre-filled syringes with heparin are available in 3 mL or 5 mL volumes, take note of volumes and syringes required. Use concentration provided at your site for this procedure.
- Additional supplies required to flush all capped lumens after blood sampling

#### If using syringe method, you will need:

- Eye protection/mask with eye shield
- Luer-lock syringes – as many as required to withdraw blood samples
- Blood transfer device for transferring blood from syringe into collection tubes

#### If obtaining coagulation tests, you will need:

- **Vacutainer method:** a 5 mL non-additive tube (refer to site below for non-additive tube color)
- **Syringe method:** an additional 10 mL syringe

#### For order of blood tube collection see:

**VCH:** [Blood collection through a VASCULAR ACCESS DEVICE \(CVC & ARTERIAL\) Reference Guide](#)

**PHC:** [Phlebotomy & CVAD Quick Reference](#)

#### Procedure:

1. Clean work surface with surface disinfectant and let dry.
2. Wash hands thoroughly for 30 seconds.
3. Gather equipment.
4. Turn off IV infusion if present. For multi lumen, ensure all IV infusions are turned off prior to blood sampling.
5. If non-valved T-CVC, clamp all lumens excluding the lumen you are drawing blood from.
6. Wash hands thoroughly for 30 seconds using waterless hand sanitizer.
7. Put on non-sterile gloves.
8. Disconnect IV tubing from needleless connector, and cap IV tubing with sterile dead-end cap to maintain sterility of IV tubing end.



9. Scrub top of needleless connector with an alcohol swab using friction for 15 seconds. **ALLOW TO DRY COMPLETELY.**
10. Attach 10 mL pre-filled NS syringe and flush catheter with a minimum of 5 mL NS.
11. Slowly aspirate discard sample (follow discard instructions below). If T-CVC is valved, pull back syringe plunger 1 to 2 mL and pause to allow valve to open and blood to come into the syringe. Continue to pull back with steady continuous pressure.

**For Discard Instructions see:**

**VCH:** [Guidelines for Collecting Blood Samples through Vascular Access Device \(VAD\)](#)

**Troubleshooting:**

If blood flow slows or stops:

- a. Check lumens for any kinks.
- b. Have patient cough, do Valsalva's maneuver, turn head to opposite side, raise arms or change position.
- c. Change blood collection tube.
- d. Use syringe to withdraw blood through the needleless connector.
- e. Change needleless connector.
- f. Flush lumen with 5 mL NS solution and if resistance to flush is felt, stop and contact Infusion Program Clinician/IV Educator.

12. Remove discard syringe.
13. Attach either Luer-lock Access Device, Holder with Pre-Attached Multiple Sample Adapter (vacutainer holder) or a 10 mL syringe and withdraw sample. See Vacutainer and Syringe method below.

**Vacutainer Method:**



1. Insert blood tubes into barrel of device and push down to aspirate blood into the tube. Continue until all tubes have been collected (if blood flow slows or stops see troubleshooting guide above) For order of blood tube collection, see:  
**VCH:** [Blood collection through a VASCULAR ACCESS DEVICE \(CVC & ARTERIAL\) Reference Guide](#)  
**PHC:** [Phlebotomy & CVAD Quick Reference](#)
2. Remove the Luer-lock Access Device, Holder with Pre-Attached Multiple Sample Adapter (vacutainer holder) and discard in the sharps container.
3. Scrub top of needleless connector with an alcohol swab using friction for 15 seconds. **ALLOW TO DRY COMPLETELY.**
4. Attach NS syringes and flush **immediately** using turbulent, stop start technique. Flush with a minimum of 20 mL NS or until no blood visible in needleless connector.
5. Remove syringe.
6. Wipe top of needleless connector with an alcohol swab to remove fluid residue.
  - a. Inpatients in Acute Care with a non-valved T-CVC: clamp lumen
  - b. If **reconnecting IV** tubing:
    - i. Connect IV tubing and resume IV infusions.
  - c. If **capping lumen, for Outpatients and Acute Care Patients on Day of Discharge with a non-valved T-CVC:**

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- i. Lock T-CVC lumen with 3 mL Heparin 10 units/mL or 100 units/mL
- ii. Remove syringe
- iii. Wipe top of needleless connector with alcohol swab to remove fluid residue
- iv. Clamp lumen
- v. If heparin not appropriate, see Part 3 Needleless Connector Use [A\) Flushing: Table, Non-valved \(clamps attached\)](#).
7. Unclamp all other lumens as necessary and reinitiate any stopped IV infusions.
8. Flush (add heparin lock for Outpatients and Acute Care Patients on Day of Discharge with a non-valved T-CVC) all capped lumens after blood sampling.
9. Label collected specimens, and send to the Lab as per lab guidelines. Refer to:  
**VCH:** [Label Samples \[D-00-12-30098\]](#)
10. Invert tubes as per:  
**VCH:** [Blood collection through a VASCULAR ACCESS DEVICE \(CVC & ARTERIAL\) Reference Guide](#)  
**PHC:** [Phlebotomy & CVAD Quick Reference](#)  
Remove gloves and wash hands thoroughly for 30 seconds.
11. Document procedure.

**Note:** if unable to draw blood using the vacutainer method, use the syringe method.

#### Syringe Method:



1. Attach empty syringe and withdraw the required amount of blood for your sample volumes, if blood flow slows or stops see [troubleshooting guide above](#).
2. If coagulation tests are required, draw an additional syringe of blood after step 1.
3. Disconnect the syringe and attach to transfer device with a twist to lock it on (if applicable you will transfer coagulation syringe first).
4. Before transferring blood samples, scrub needleless connector with an alcohol swab using friction for 15 seconds. **ALLOW TO DRY COMPLETELY.**
5. Attach NS syringes and flush immediately using turbulent, stop start technique. Flush with a minimum of 20 mL NS or until no blood visible in needleless connector.
6. Remove syringe.
7. Wipe top of needleless connector with an alcohol swab to remove fluid residue.
  - a. Inpatients in Acute Care with a non-valved T-CVC: clamp lumen
- b. If reconnecting IV tubing:**
  - i. Connect IV tubing and resume IV infusions.
- c. If capping lumen, for Outpatients and Acute Care Patients on Day of Discharge with a non-valved T-CVC:**
  - i. Lock lumen with 3 mL Heparin 10 units/mL or 100 units/mL
  - ii. Remove syringe
  - iii. Wipe top of needleless connector with alcohol swab to remove fluid residue
  - iv. Clamp lumen
  - v. If heparin not appropriate, see Part 3 Needleless Connector Use [A\) Flushing: Table, Non-valved \(clamps attached\)](#).
8. Wear eye protection when transferring blood from syringe to lab tubes.

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9. With the syringe held vertically and the tip pointing down, insert blood-sampling vacuum tube into the barrel of device to collect blood sample. Allow vacuum to fill the tube (e.g. do not apply pressure to syringe plunger). Continue until all sample tubes have been collected into appropriate lab tubes.
10. For order of blood tube collection, see:  
**VCH:** [Blood collection through a VASCULAR ACCESS DEVICE \(CVC & ARTERIAL\) Reference Guide](#)  
**PHC:** [Phlebotomy & CVAD Quick Reference](#)
11. Dispose of needleless blood transfer assembly and syringe as one unit into the sharps container. Do not disassemble.
12. Unclamp all other lumens as necessary and reinstate any stopped IV infusions.
13. Flush (add heparin lock for Outpatients and Acute Care Patients on Day of Discharge with a non-valved T-CVC) all capped lumens after blood sampling.
14. Label collected specimens, and send to the Lab as per lab guidelines, refer to:  
**VCH:** [Label Samples \[D-00-12-30098\]](#)
15. Invert tubes as per:  
**VCH:** [Blood collection through a VASCULAR ACCESS DEVICE \(CVC & ARTERIAL\) Reference Guide](#)  
**PHC:** [Phlebotomy & CVAD Quick Reference](#)
16. Remove gloves and wash hands thoroughly for 30 seconds.
17. Document procedure.

## Patient/Client/Resident Education

Pamphlet: (available from Patient Health Education Materials Catalogue - [VCH](#) or [PHC](#))

- All about your Tunneled Line (Cat# [FA.200.SE481](#))

## Documentation

Document on site-specific documentation tools as per policy.

## Related Documents

- VCH Online e-learning CVC Care and Maintenance Module

## References

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6. Phillips, L.D. & Gorski, L. (2014). *Manual of I.V. therapeutics: Evidence-based practice for infusion therapy* (6th ed.). Philadelphia, PA: F.A. Davis CO.
7. The Canadian Vascular Access Association (CVAA). (2013). Occlusion management guideline for central venous access devices (CVADs). *Vascular Access*, 7(Suppl.1), 1-34.
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VCH: *(Regional SharePoint 2nd Reading)*  
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### Final Sign-off & Approval for Posting by

Vice President Professional Practice and Chief Clinical Information Officer, VCH  
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### Date of Approval/Review/Revision

Approved & Posted: July 5, 2016  
Revised: April 19, 2017 *(links updated)*  
July 24, 2017 *(Practice Level and Dressing changes)*  
August 28, 2018 *(Procedure videos added)*  
December 19, 2018 *(Added appendices and links to PN documents for tubing change times)*  
Jan 21, 2019 *(Added appendices, TPN Tubing Set table and Checklists)*  
March 05, 2019 *(Changed point #6 in Vacutainer Method Checklist.)*

## Appendix A: PHC Practice Level/Education Requirements

### **RN (RPN at SPH Only): with additional education**

- Successful completion of a Central Venous Catheter (CVC) Care & Maintenance Learning Module.
- Attendance of IV Specific Orientation session and CVC Care and Maintenance instruction lab as required by work site.
- Demonstrate competency through a site specific formal process (*may include observation by experienced RN/Educator/Clinical Resource Nurse*).
  - Specialized education is not required to perform a site assessment, change intravenous (IV) infusion bags or administer medication into a continuous IV infusion.

### **Additional specialized education is required for PICC:**

- Insertion
- Tip confirmation prior to initial access
- Exchange
- Repair
- Occlusion Management
- PICC adjustment
- PICC removal

### **LPN requirements: (Practice limited to Acute sites only)**

- Successful completion of a CVC Care & Maintenance Learning Module.
- Attendance of Orientation session on IV therapy as required by work site.
- A LPN who has completed the site specific relevant orientation may:
  - Report/consult with RN for suspected complications and problem solving (shared provision of care).
  - Assess PICC insertion site for complications and dressing status.

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## Appendix B: VCH Practice Level/Education Requirements

### RN: with additional education

#### ALL:

- Successful completion of the CVC Care & Maintenance E-Learning Module.
- Demonstrates competency through a formal process – (see [Performance Checklists](#) – pgs 27-29).

#### Acute:

- Attendance of Hospital Wide Orientation session on Parenteral Therapy.
- Attendance of CVC Care and Maintenance Instruction Lab.

#### Community:

- Attendance of IV Specific Orientation session as required by work site.

An RN who has completed the requirements may perform the following skills:

- Site assessment
- Flushing
- Tubing change
- Needleless connector change
- Dressing change
- Obtaining a blood sample

An RN who is new at performing the above skills, or who has identified a need for review, must be observed by an experienced RN, Educator, or Clinical Resource Nurse.

An RN who **has not** completed the requirements may:

- Perform a site assessment
- Change intravenous (IV) infusion bag
- Administer medication into a continuous intravenous infusion

**An RN requires specialized training for:**

- Occlusion Management
- Repair

### LPN requirements: (Practice limited to Acute sites only)

- Successful completion of Section A of the CVC Care & Maintenance E-Learning Module.
- Attendance of Hospital Wide Orientation session on Parenteral Therapy.
- A LPN who has completed the site specific relevant orientation may:
  - Report/consult with RN for suspected complications and problem solving (shared RN/LPN provision of care).
  - Assess T-CVC insertion and exit sites for complications and dressing status.

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## Appendix C: Management of Complications for Tunneled-CVC



Complications	Signs & Symptoms	Management	Prevention
<b>1. Air Embolism:</b> Air is drawn through the catheter into the patient's vascular system. Air embolism can occur during insertion and/or removal of T-CVC.	<ul style="list-style-type: none"> <li>• Light-headedness</li> <li>• Restlessness anxiety</li> <li>• Chest pain</li> <li>• A sense of impending doom</li> <li>• Nausea</li> <li>• Tachycardia</li> <li>• Hypotension</li> <li>• Dyspnea, tachypnea</li> <li>• Cyanosis changes in mental state, confusion, seizures</li> <li>• Unresponsiveness</li> <li>• Rales or wheezing in the presence of pulmonary edema</li> </ul>	<ul style="list-style-type: none"> <li>• Clamp the open/cracked lumen/catheter close to the exit (chest) site with non-toothed forceps, clean with alcohol, cover with sterile gauze and apply an occlusive dressing (device may be repairable).</li> <li>• Place patient on Left side (this permits the air bubble to rise to upper part of the Right Atrium).</li> <li>• Acute: call a code</li> <li>• Community: call 911</li> <li>• Vital signs every 5 minutes</li> <li>• Administer oxygen</li> </ul>	<ul style="list-style-type: none"> <li>• Use luer-lock connections and secure well</li> <li>• For non-valved T-CVC, clamp catheter/lumen when changing administration set/cap.</li> <li>• Provide patient education re: catheter displacement and disconnection.</li> <li>• When T-CVC removed, apply Vaseline gauze and occlusive dressing to exit site.</li> </ul>
<b>2. Arrhythmias:</b> Tip of catheter is placed within the Right atrium; leads to cardiac muscle irritability and arrhythmias	<ul style="list-style-type: none"> <li>• Irregular pulse</li> <li>• Chest Pain</li> <li>• Palpitations</li> </ul>	<ul style="list-style-type: none"> <li>• Obtain CXR to confirm tip position</li> <li>• If in Right Atrium contact Physician who inserted T-CVC</li> </ul>	<ul style="list-style-type: none"> <li>• Confirm catheter tip placement prior to use</li> </ul>
<b>3. Infection:</b> Could be local or systemic	<p><i>Local:</i></p> <ul style="list-style-type: none"> <li>• Purulent drainage, erythema</li> <li>• Swelling</li> <li>• Tenderness at site and tunnel</li> </ul> <p><i>Systemic:</i></p> <ul style="list-style-type: none"> <li>• Fever/chills</li> <li>• Increased WBC</li> <li>• Malaise</li> <li>• Hypotensive &amp; shock</li> </ul>	<p><i>Local:</i></p> <ul style="list-style-type: none"> <li>• Contact physician.</li> <li>• Swab exit site for C&amp;S prior to starting antibiotics.</li> </ul> <p><i>Systemic:</i></p> <ul style="list-style-type: none"> <li>• Contact physician</li> <li>• Catheter removal may be necessary if treatment is unsuccessful.</li> <li>• Obtain peripheral blood cultures as well as blood cultures from the central line.</li> <li>• Send catheter tip for C&amp;S if line is removed.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess site every shift and PRN.</li> <li>• Aseptic technique to be used at all times during care &amp; maintenance.</li> <li>• Monitor vital signs and temperature.</li> <li>• Monitor lab results.</li> <li>• Review necessity of line daily &amp; ensure prompt removal of unnecessary lines</li> </ul>

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Complications	Signs & Symptoms	Management	Prevention
<p><b>4. Partial Occlusion:</b></p> <p>Able to infuse, but unable to withdraw blood.</p> <p><i>Contributing factors:</i></p> <ul style="list-style-type: none"> <li>Failure to flush/lock according to catheter flushing procedure resulting in lumen obstruction.</li> <li>Catheter opening may draw up against vein wall with aspiration.</li> <li>Blood clot, fibrin sheath, or particulate matter obstructing catheter, when blood is being aspirated from the catheter.</li> <li>Sutures may be too tight.</li> <li>Kinked catheter outside or inside the body.</li> <li>Malposition of catheter tip.</li> </ul>	<ul style="list-style-type: none"> <li>Sluggish flow of IV fluids.</li> <li>Difficulty flushing.</li> <li>Inability to aspirate blood.</li> </ul>	<ul style="list-style-type: none"> <li>Have patient cough, do Valsalva's maneuver, turn head to opposite side, raise arms or change position.</li> <li>Flush with 10 mL NS in a 10 mL syringe using a gentle push-pause technique. If resistance to flush is felt, stop.</li> <li>If no resistance to flush is felt, pull back gently on the syringe plunger 2 to 3 mL, pause and proceed with aspiration.</li> <li>Attempt to aspirate with a small syringe (3 to 5 mL) which exerts less negative pressure when withdrawing blood.</li> <li>Change needleless connector.</li> <li>Notify the physician; obtain order for Thrombolytic Therapy</li> <li>Notify Infusion Program Clinician/IV Educator to instill Thrombolytic Therapy.</li> <li>If able to flush and aspirate blood, flush the lumen with 20 mL NS and continue with therapy.</li> <li>Document the type of occlusion, intervention, patient response, and physician intervention.</li> </ul>	<ul style="list-style-type: none"> <li>Routine turbulent flushing with 20 mL NS after intermittent medications, blood product transfusions or following obtaining blood sample.</li> <li>Follow guidelines for routine T-CVC flush and lock.</li> <li>Check for lumen patency prior to accessing.</li> <li>Do not leave partial occlusion unresolved, as it will turn into total occlusion.</li> </ul>
<p><b>5. Total Occlusion:</b></p> <p>Inability to withdraw blood or infuse.</p> <p><i>Contributing factors:</i></p> <ul style="list-style-type: none"> <li>Blood, drug precipitate or lipid deposits completely obstruct the lumen.</li> <li>May be kinked, coiled or damaged.</li> <li>Sutures used during catheter placement may have tightened and restricted flow.</li> </ul>	<ul style="list-style-type: none"> <li>Unable to flush or aspirate blood.</li> </ul>	<ul style="list-style-type: none"> <li>Do not force flush.</li> <li>Assess catheter and tubing for kinks in line or tight sutures</li> <li>Move the patient's arm, shoulder and head to see if a position change affects the ability to infuse.</li> <li>Notify the physician; obtain order for Thrombolytic Therapy</li> <li>Notify Infusion Program Clinician/IV Educator to instill Thrombolytic Therapy</li> <li>If occlusion not fibrin/blood related (i.e. drug precipitate, lipid deposits), notify Infusion Program Clinician/IV Educator to identify source of occlusion and treat with appropriate agent.</li> <li>Discuss Radiologic studies, e.g. CXR, Venogram</li> <li>Report and document occlusion, interventions and response.</li> </ul>	<ul style="list-style-type: none"> <li>Routine turbulent flushing with 20 mL NS after intermittent medications, blood product transfusions or following obtaining blood sample.</li> <li>Follow guidelines for routine T-CVC flush and lock.</li> <li>Check for lumen patency prior to accessing.</li> <li>Check for sutures that are tight and restricting flow around the catheter and remove them.</li> </ul>

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Complications	Signs & Symptoms	Management	Prevention
<p><b>6. “Stuck” needleless connector cap</b></p>	<ul style="list-style-type: none"> <li>Unable to remove cap from catheter lumen</li> <li>Two potential causes: <ul style="list-style-type: none"> <li>Over-tightening of cap when accessing (see photos in ‘prevention’)</li> <li>Fluid has crystallized between cap and catheter lumen</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Reassess routinely</li> <li>Change cap after collecting blood sample if flushing does not clear cap</li> <li>If “stuck” cap, try using a latex Penrose drain for grip to remove</li> <li>May try alcohol swab between cap and lumen hub to dissolve crystallized solution</li> <li>Notify Infusion Program Clinician/IV Educator</li> <li>Forceps may crack or break T-CVC, and are only to be used after Infusion Program Clinician/IV Educator notified.</li> </ul>	<ul style="list-style-type: none"> <li>After priming new cap, tip excess fluid out of end of cap prior to attaching to catheter lumen</li> <li>When attaching new cap, finger tighten only</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>With any luer-access (syringe or IV tubing), <b>hold at base of cap.</b></li> </ul>  <ul style="list-style-type: none"> <li>When “turning on” to cap, continue to <b>hold cap at base</b></li> </ul> 
<p><b>7. Venous Thrombosis:</b> A clot between the catheter and the vein.</p> <p><i>Contributing factors:</i></p> <ul style="list-style-type: none"> <li>Improper flushing of catheter lumen(s) causing fibrin sheath/clot formation in catheter or at tip of catheter in vein.</li> <li>Predisposing patient history related to blood clotting (i.e. cancer)</li> <li>Incorrect tip position (i.e. in Upper SVC or Brachiocephalic, or Subclavian vein)</li> </ul>	<ul style="list-style-type: none"> <li>Edema/cyanosis of arm on the same side as CVC line</li> <li>Pain</li> <li>Swelling of neck, face, shoulder, arm or chest.</li> <li>External jugular vein distention.</li> <li>Change in ability to infuse or withdraw.</li> </ul>	<ul style="list-style-type: none"> <li>Acute: contact Infusion Program Clinician/IV Educator and Physician.</li> <li>Community: arrange for client to return to hospital for assessment.</li> <li>After informing the above clinicians/physician observe the client hourly &amp; PRN</li> <li>Follow up with diagnostic studies (Ultrasound and/or venogram)</li> <li>Anticoagulation therapy as directed by Physician.</li> <li>Device removal is the responsibility of the Physician. (T-CVC may be left in place during anticoagulation treatment).</li> </ul>	<ul style="list-style-type: none"> <li>Assess for signs &amp; symptoms of venous thrombosis every shift and PRN.</li> <li>Check for lumen patency prior to accessing.</li> <li>Use turbulent, stop start technique.</li> <li>Use needleless connector.</li> </ul>

Complications	Signs & Symptoms	Management	Prevention
<b>8. Superior Vena Cava Syndrome:</b> Occlusion of the SVC by a thrombus. SVC syndrome results in increased venous pressure, which results in central nervous system disturbances. SVC syndrome can lead to cerebral and vocal cord edema and death.	<ul style="list-style-type: none"> <li>Progressive edema of upper extremity, neck and face.</li> <li>Dilatation of the superficial veins of the chest, neck, and arms.</li> <li>Collateral veins of chest, neck.</li> <li>Peri-orbital edema (swollen eyes)</li> <li>Tachycardia</li> <li>Hypotension</li> </ul>	<ul style="list-style-type: none"> <li>Notify physician and Respiratory Therapist STAT.</li> <li>Community client: call 911</li> <li>Position patient comfortably.</li> <li>Apply oxygen.</li> <li>Obtain peripheral venous access.</li> <li>Vital signs every 5 minutes and PRN</li> </ul>	<ul style="list-style-type: none"> <li>Assess every shift and PRN for signs of increased swelling of face, chest and eyes.</li> <li>Assess for signs &amp; symptoms of venous thrombosis every shift.</li> <li>Check for lumen patency prior to accessing.</li> </ul>
<b>9. Extravasation</b> Soft tissue damage due to leaking of vesicant or irritating drug from a vein into the surrounding tissue.  <i>Contributing Factors:</i> <ul style="list-style-type: none"> <li>Catheter dislodgement.</li> <li>Catheter broken internally</li> <li>Presence of a fibrin sheath.</li> </ul>	<ul style="list-style-type: none"> <li>Edema</li> <li>Erythema</li> <li>Pain or burning during or after infusion in area of vascular access device.</li> <li>Unable to obtain blood return with aspiration</li> </ul>	<ul style="list-style-type: none"> <li>Stop infusion</li> <li>Notify physician STAT</li> <li>Warm or cold treatment as per ordered medication protocol.</li> <li>Attempt to aspirate the drug or solution from the catheter</li> <li>Follow Extravasation Protocol.</li> <li>Document observation, assessment and treatment.</li> </ul>	<ul style="list-style-type: none"> <li>Check site every shift and PRN.</li> <li>Check for lumen patency prior to accessing</li> <li>When administering vesicants, check for blood return with aspiration prior to drug administration.</li> <li>Review CXR to confirm correct tip position.</li> <li>Have antidotes available when administering vesicant drugs.</li> </ul>
<b>10. Catheter Dislodgement</b>  Line is partially or totally dislodged.  <i>May cause:</i> <ul style="list-style-type: none"> <li>Hemorrhage or</li> <li>Air Embolus - Air can be drawn up through dislodged, cracked, or disconnected non-valved T-CVC or IV tubing into the patient's vascular system causing an Air Embolus.</li> </ul>	<p><i>Partial Dislodgement:</i></p> <ul style="list-style-type: none"> <li>Cuff is visible at exit site</li> <li>Swelling in the chest wall during infusion.</li> <li>Leaking at catheter site.</li> <li>Pain or discomfort with infusion.</li> <li>External portion of catheter may have increased in length</li> <li>Obvious bleeding from disconnected tubing.</li> </ul> 	<p><i>Partial dislodgement:</i></p> <ul style="list-style-type: none"> <li>Stabilize catheter</li> <li>Stop IV</li> <li>Position patient supine</li> <li>Notify Infusion Program Clinician/IV Educator and Physician.</li> <li>Monitor vital signs</li> <li>Obtain CXR</li> </ul> <p><i>Complete Dislodgement:</i></p> <p>Asymptomatic:</p> <ul style="list-style-type: none"> <li>Position patient on left side</li> <li>Apply pressure to vein entrance site (neck) for 5 mins</li> <li>Apply Vaseline gauze and occlusion dressing to exit site</li> <li>Monitor for S&amp;S of air embolism and hemorrhage</li> <li>Notify physician</li> </ul>	<ul style="list-style-type: none"> <li>Remove sutures as per protocol</li> <li>Ensure the cuff is not visible at exit site at the beginning of every shift, with each dressing change and PRN.</li> <li>Secure catheter to skin/ clothing to prevent pulling.</li> <li>Avoid pulling on catheter when transferring/ positioning patient.</li> </ul>

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Complications	Signs & Symptoms	Management	Prevention
	<p><i>Complete Dislodgement:</i></p> <ul style="list-style-type: none"> <li>• Hemorrhage</li> <li>• Air Embolus</li> <li>• Hypotension, tachycardia, pallor, altered level of consciousness</li> <li>• Catheter has completely dislodged out of the insertion site.</li> </ul>	<p>Symptomatic:</p> <ul style="list-style-type: none"> <li>• Position on left side</li> <li>• Initiate resuscitation measures</li> <li>• Acute: call a code</li> <li>• Community: call 911</li> <li>• Continue to apply pressure to vein entrance site (neck) until bleeding stops</li> <li>• Apply Vaseline gauze and occlusive dressing to exit site</li> </ul>	
<p><b>11. Catheter damage tear or leak</b></p> <p><i>Contributing factors:</i></p> <ul style="list-style-type: none"> <li>• Contact with a sharp object</li> <li>• Rupture from attempt to irrigate an occluded catheter with a syringe smaller than 10 mL</li> </ul>	<ul style="list-style-type: none"> <li>• IV fluid or blood leaking out of T-CVC.</li> <li>• Signs &amp; symptoms of Air Embolism</li> <li>• External portion of catheter may have increased in length</li> </ul>	<ul style="list-style-type: none"> <li>• Clamp catheter close to exit (chest) site with a non-toothed forceps.</li> <li>• Prevent air emboli.</li> <li>• If the lumen or catheter is broken clean with alcohol, cover with sterile gauze then apply occlusive dressing (gauze &amp; transparent dressing), it may be repairable.</li> <li>• Notify Infusion Program Clinician/IV Educator and Physician.</li> </ul>	<ul style="list-style-type: none"> <li>• 10 mL syringe is the smallest size syringe used to flush a T-CVC.</li> <li>• Secure catheter to skin/clothing to prevent pulling</li> <li>• Avoid pulling on T-CVC when transferring/positioning patient</li> <li>• If unable to remove exit sutures safely, contact Physician.</li> <li>• Ensure the cuff is not visible at the exit site at the beginning of every shift, with each dressing change and PRN.</li> <li>• No sharp objects near T-CVC</li> <li>• Ensure line is not twisted or kinked before flushing.</li> </ul>
<p><b>12. Blood noted in Catheter</b></p> <p><i>Contributing factors:</i></p> <ul style="list-style-type: none"> <li>• Placement of the catheter in the right atrium or ventricle. Contractions of the heart muscle can force blood into the catheter.</li> <li>• Increased pressure in the SVC due to excessive coughing, vomiting.</li> <li>• Flush/lock protocols not followed.</li> </ul>	<ul style="list-style-type: none"> <li>• Blood seen in catheter lumen</li> <li>• Signs &amp; symptoms of Air embolism</li> </ul>	<ul style="list-style-type: none"> <li>• If catheter is fractured, clamp T-CVC close to the exit (chest) site with non-toothed forceps, clean with alcohol, cover with sterile gauze and apply transparent dressing (device may be repairable).</li> <li>• Attempt to aspirate blood from the catheter, if blood aspirated flush with 20 mL NS. If unable to aspirate blood, follow total occlusion management protocol (above).</li> <li>• Ensure needleless connector is used and secure.</li> <li>• If non-valved, clamp lumen when not in use.</li> <li>• Consider CXR to confirm tip placement.</li> <li>• Notify Infusion Program Clinician/IV Educator and Physician</li> </ul>	<ul style="list-style-type: none"> <li>• T-CVC correct tip confirmation prior to use.</li> <li>• Ensure needleless connector tubing connections are secure.</li> <li>• 10 mL syringe is the smallest size syringe used to flush a T-CVC.</li> <li>• Secure catheter to skin/clothing to prevent pulling.</li> <li>• Avoid pulling on T-CVC when transferring/positioning patient.</li> <li>• No sharp objects near T-CVC.</li> </ul>

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Complications	Signs & Symptoms	Management	Prevention
<b>13. Fluid leak from T-CVC exit site (chest)</b>  <i>Contributing factors:</i> <ul style="list-style-type: none"> <li>Catheter punctured by sharp object prior to placement</li> <li>Catheter ruptured from attempt to irrigate an occluded catheter with a small syringe</li> <li>Catheter pulled back large amount</li> </ul>	<ul style="list-style-type: none"> <li>Fluid visibly leaking from T-CVC exit site (chest)</li> <li>Redness, inflammation may be present if fluid leak not visible.</li> </ul>	<ul style="list-style-type: none"> <li>Infuse 10 mL NS and assess for signs of fluid extravasation/infiltration under the skin.</li> <li>Notify Infusion Program Clinician/IV Educator and Physician</li> <li>Linogram may be required</li> <li>If the lumen or catheter is broken clamp lumen/T-CVC with non-toothed forceps, clean with alcohol, cover with sterile gauze, and apply transparent dressing (device may be repairable).</li> <li>T-CVC will be removed if leak is caused by hole or tear in catheter and is irreparable.</li> <li>If leak is due to seeping edema, fold 2x2 gauze, create pressure point over the insertion site and cover with occlusive dressing. Change pressure dressing in 24 hours and PRN.</li> </ul>	<ul style="list-style-type: none"> <li>No sharp objects near T-CVC.</li> <li>10 mL syringe is the smallest size syringe used to flush a T-CVC.</li> <li>Avoid pulling on T-CVC when transferring/positioning patient</li> <li>If unable to remove exit sutures safely contact Physician.</li> </ul>
<b>14. Attempt to power inject through non power related device</b>	<ul style="list-style-type: none"> <li>T-CVC will rupture</li> <li>Possible contrast medium infiltration</li> <li>Pain swelling along T-CVC vein pathway</li> </ul>	<ul style="list-style-type: none"> <li>Stop the infusion STAT</li> <li>Clamp lumen/T-CVC with non-toothed forceps STAT</li> <li>Notify physician STAT</li> <li>Notify the Infusion Program Clinician/IV Educator STAT</li> <li>Apply cool compress</li> </ul>	<ul style="list-style-type: none"> <li><b>Do not power inject into a T-CVC not labeled as power injectable.</b></li> </ul>



## Appendix D: Checklists

### Skills Performance Checklist Dressing Change Tunneled Central Venous Catheter

Name: \_\_\_\_\_ Unit: \_\_\_\_\_

Assessor: \_\_\_\_\_ Date: \_\_\_\_\_

#### RN requirements:

- Successful completion of the CVC Care & Maintenance E-Learning Module
- Attendance of CVC Care and Maintenance Instruction Lab
- Demonstrates competency through a formal process

Available resources: [BD-00-12-40067: Tunneled Central Venous Catheter \(T-CVC\)](#)

TASK	YES	NO	RELATED QUESTIONS
1. Clean work surface with surface disinfectant and let dry. Wash hands thoroughly for 30 seconds.			• When is the T-CVC dressing changed?
2. Gather equipment. Put on mask. Position patient.			
3. Wash hands thoroughly. Set up dressing tray.			
4. Put on non-sterile gloves.			
5. Assess chest for presence of cuff or other signs of complication.			• Describe assessment of the site and surrounding skin. • What interventions are followed if complications visible?
6. <b>Dressing removal:</b> follows instructions appropriate for dressing used at work site.			
7. Remove gloves, wash hands. Put on sterile gloves.			
8. <b>Clean catheter and exit site:</b> <ul style="list-style-type: none"> <li>• Use 1<sup>st</sup> Large CHG wipe to clean catheter exit site</li> <li>• Anchor T-CVC at the catheter site with sterile forceps</li> <li>• Wrap 2<sup>nd</sup> Large CHG wipe around catheter. Clean the catheter moving away from the exit site including permanent stabilization wing.</li> <li>• Clean all of the catheter lumen that will be under the dressing.</li> </ul>			• Describe solutions used to clean skin.
9. Clean the catheter and skin with CHG 2% with alcohol 70% swab stick <ul style="list-style-type: none"> <li>• Clean using friction in multiple directions x 15 seconds.</li> <li>• Repeat with second swab stick. Skin contact with cleanser must be for a minimum of 15 seconds per swab stick.</li> <li>• Ensure entire area that will be covered by dressing (approximately 10 x 10 cm) is cleansed.</li> </ul>			• What is the rationale for friction rub of the skin?
10. Allow skin to dry <b>completely</b> (approximately 3 minutes) to prevent skin irritation. If required, apply skin prep, allow to dry completely.			

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11. <b>Dressing application:</b> follow instructions appropriate for dressing used at work site.			
12. To prevent pulling, loop catheter under dressing or secure to clothing.			
13. Label dressing with date.			
14. Remove gloves, mask, and wash hands thoroughly.			
15. Document procedure.			

## Skills Performance Checklist – Answer Key

### Dressing Change Tunneled Central Venous Catheter

QUESTIONS	ANSWERS
When is the T-CVC dressing changed?	<ul style="list-style-type: none"> <li>The insertion site must be assessed within 24 hours after insertion.</li> <li>If site visible (e.g. transparent gel-pad dressing), assess need for dressing change based on drainage type and saturation of gel-pad dressing.</li> <li>Gauze dressing is changed a minimum of every 48 hours and when needed if loose, or if moisture, drainage, blood or signs or symptoms of infection are present.</li> <li>Transparent, semi-permeable dressing is changed every 7 to 8 days and as needed when loose, or if moisture, drainage, blood or signs or symptoms of infection are present.</li> </ul>
Describe assessment of the site and surrounding skin?	<ul style="list-style-type: none"> <li>Assessment involves checking for signs of redness, swelling, tenderness, discharge, catheter migration, leaking from site.</li> <li>For the first 3 to 4 weeks after insertion, the T-CVC is secured by a suture at the exit site on the skin to support the catheter and ensure adequate healing of the cuff into the subcutaneous tissue.</li> </ul>
What interventions are followed if complications visible?	<ul style="list-style-type: none"> <li>If a cuff is seen at the exit site, this indicates the catheter has been pulled. It is not normal for the cuff to be visible at the exit site.</li> <li>Notify responsible physician and arrange for a CXR to confirm tip placement if the cuff is visible.</li> <li>Do not use the catheter until tip placement is confirmed.</li> <li>Swab taken for C &amp; S</li> <li>Refer to <a href="#">Appendix C</a> for complications.</li> </ul>
Describe solutions used to clean skin.	<ul style="list-style-type: none"> <li>Untinted Chlorhexidine Gluconate 2% (CHG) with 70% alcohol is used for skin cleansing. UNLESS skin irritation is related to an interaction between the adhesive in the dressing, and the alcohol of the prep</li> <li>Betadine (Povidone Iodine 10%) is used as an alternative to CHG in cases of contact dermatitis or allergy. Do not wash off with saline solution.</li> <li>Saline is not an antiseptic therefore not recommended as cleaning agent for dressing change.</li> <li>May use sterile normal saline to cleanse site if saturated with blood; follow with skin antiseptic. (Note: CHG may be inactivated if used with normal saline. Ensure skin is completely dried prior to cleaning with CHG.)</li> <li>For skin impairment, irritation and skin cleansing/dressing recommendations, contact Infusion Program Clinician/ IV Educator.</li> </ul>
What is the rationale for friction rub of the skin?	<ul style="list-style-type: none"> <li>The application of friction allows the solution to penetrate the lower layers of the epidermis thus providing better antimicrobial action on the skin.</li> </ul>

## IVAD Procedure Resource Videos

### 1. Set up

- a. [Cleaning work surface area](#)
- b. [Washing hands](#)
- c. [Clean hands with Gel](#)
- d. [Preparing and setup of dressing tray](#)

### 2. IV Infusion Access

- a. [Initiating IV Infusion](#)
- b. [Discontinuing IV Infusion](#)

### 3. IVAD Access

- a. [IVAD Accessing](#)

### 4. IVAD De-Access

- a. [IVAD Deaccessing](#)

### 5. Flushing

- a. Valved Catheter
  - i. [Flushing of Valved Line CVC](#)
- b. Non-Valved Catheter
  - i. [Flushing of Non-Valved CVC](#)

### 6. Blood Draw

- a. Valved Catheter
  - i. [PICC – Blood Draw](#)
- b. Non-Valved Catheter
  - i. [NT-CVC – Blood Draw](#)