Purpose

- To identify standards of care for patients with percutaneously inserted non-tunneled Central Venous Vascular Access Devices (CVADs).
- To act as a resource for staff so that errors leading to complications are reduced.
- To identify and comply with current best practices from infection control and infusion nursing standards.

Policy Statement

Health care professionals who care for, maintain and CVADs shall have education and demonstrated competency.

All CVADs shall be reviewed daily for line necessity. **Unnecessary lines will be removed promptly.**

Only power injectable central catheters may be used to administer power injected radiographic IV contrast.

CVADs placed in **emergency situations** and/or without full barrier precautions are to be **re-sited** as soon as the situation becomes stable and within 48 hours.

Applicability

This policy and procedure applies to all Covenant Health facilities, staff, members of the medical staff, students and any other persons acting on behalf of Covenant Health.

Responsibility

Health care professionals, who care for, maintain, or remove CVADs must clearly understand their indications for use and the potential for complications and adhere to current evidence-based practices outlined herein.

Health care professionals shall demonstrate compliance with this policy and procedure by:

- adhering to the education requirements;
- ensuring that they understand the appropriate care and maintenance needed to prevent infection after the CVAD is inserted; and
- providing proper care of the CVAD post-insertion to preventing Central Line Associated Blood Stream Infections (CLABSI).

It is the health care professional’s responsibility to identify and communicate when they are no longer competent with this skill.
Care and Removal of Central Vascular Access Devices – Non-tunnelled

Principles

Using infection prevention maintenance bundles decreases central line associated blood stream infections.

Indications for use of CVAD:
- Administration of medications, such as chemotherapy or antibiotics
- Administration of fluids, including blood or blood products
- Monitoring of central venous pressure
- Providing parenteral nutrition
- Providing hemodialysis

Procedure

See Attached

Definitions

_Catheter flush_ is a technique whereby the solution is pushed through the catheter into the bloodstream (no dwell time)

_Catheter lock_ is a technique by which a solution is injected into the catheter lumen dead space until it is filled and then allowed to dwell for a period of time, until the catheter is accessed again.

_Health care professional_ means an individual who is a member of a regulated health discipline, as defined by the Health Disciplines Act or the Health Professions Act, and who practices within scope or role.

_Most responsible health practitioner_ means the health care professional who has responsibility and accountability for the specific treatment/procedure(s) provided to a patient and who is authorized by Covenant Health to perform the duties required to fulfill the delivery of such a treatment/procedure(s), within the scope of his/her practice.

_Qualified health care professionals_ are individuals who are authorized to provide care relative to this policy/procedure in accordance with their respective practice Regulation under the Health Professions Act (or other legislation) and in accordance with Covenant Health policy.

_Scrub the hub_ means each time the needleless connector is entered it must be cleaned with an alcohol or chlorhexidine/alcohol wipe. Scrub the needleless connector with the wipe for 15 seconds using friction and allow the solution to dry.

Related Documents

- Corporate Policy #VII-B-330, *Maintenance of IV / Hypodermoclysis Equipment*
- 3M™ Tegaderm™ I.V. Advanced Securement Dressing, 1685 PICC Application Technique (attached)
- 3M™ Tegaderm™ Chlorhexidine Gluconate I.V. Securement Dressing, 1659R Application Technique (attached)
References


Arrow International, Guidelines for the Use of the Arrow-Howes, Multilumen Catheter


Care and Maintenance of Devices, 2005, Nursing Best Practice Guidelines, Shaping the future of Nursing, Registered Nurses Association of Ontario


Hadaway L. Misuses of prefilled flush syringes. Infection Control Resources. 2008;4(4):2-4


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Szkotak, Artur. Email correspondence to Gwen Clarke, Denise Steele, Susan Nahirniak and Bruce Ritchie. January 25, 2013, 5:30 pm. "How much sodium citrate will alter coagulability &/or electrolyte levels?"


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January 9, 2015
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1.0 INFECTION PREVENTION & CONTROL

1.1 While they are in hospital, daily bathing or scrubs with chlorhexidine impregnated cleansing towelettes will help reduce the resident bacteria on the patient's skin.

1.2 Care and Maintenance Infection Prevention and Control Measures

1.2.1 To minimize the risk CLABSI associated with direct contact of the hands of health care personnel, hand hygiene is to be performed at the following times:
   - before and after palpating the site of catheter insertion
   - before and after inserting the catheter
   - before and after accessing, replacing, repairing, or dressing the catheter.

1.2.2 PPE must be worn when flushing a CVAD.

1.2.3 Aseptic technique is required for all instances of CVAD care and maintenance. Aseptic technique is also referred to as sterile technique and is used to keep objects and areas free of microorganisms and thereby minimize infection risk for the patient.

1.2.4 Strict aseptic technique is required for:
   1. administration set changes,
   2. dressing changes,
   3. intermittent needleless connector changes.

1.2.5 Hands are to be cleansed with alcohol based hand sanitizer prior to flushing, locking, handling administration sets, etc. Sterile gloves must be worn for dressing changes.

1.3 To maintain a “closed” system:

1.3.1 Attach an needleless connector to lumen ends. Ensure they are properly luered. If cleansing extension tubing, ensure that the extension tubing is completely dry prior to attaching needleless connector to prevent it from bonding to the catheter lumen.

1.3.2 Attach administration sets to the needleless connector.

1.3.3 Single and multiple lumen catheters are available. The suggested use of Arrow® (brand) multi-lumen catheter ports is shown below (Diagram 1).
Proximal: Blood Sampling  
Medications  
Blood Administration  

Medial: Total Parenteral Nutrition  
Medications (only if TPN use is not anticipated)  

Distal: CVP Monitoring  
Blood Administration  
High Volume or Viscous Fluids  
Colloids  
Medication  

4th Lumen: Infusion  
Medication  

2. Post Insertion

2.1 Arrange for a portable chest x-ray (ordered by most responsible health practitioner). CVAD tip position (superior / inferior vena cava) must be verified by a qualified health care professional to ensure correct placement prior to infusing medications or TPN. Correct tip position for jugular and subclavian insertion sites is the distal superior vena cava at the junction of the right atrium. Appropriate tip position for femoral insertion site is thoracic inferior vena cava above the level of the diaphragm.

2.2 Observe patient for signs and symptoms of pneumothorax, arterial puncture, and pericardial tamponade (see section 11 for complications).

2.3 Remove femoral catheters as soon as possible, or replace with other IV access as appropriate for patient condition.

2.4 Do not ambulate patients with femoral catheters due to increased risk of dislodgement and catheter related deep vein thrombosis.
3.0 SITE ASSESSMENT

3.1 Visually inspect insertion site and palpated through an intact dressing. If there is fever without an obvious source, tenderness at the insertion site, or other symptoms suggesting either local or bloodstream infection, the dressing should be removed and the site thoroughly inspected.

3.2 Observe the catheter and insertion site for:

* swelling
* redness
* tenderness
* drainage
* dislodgement / malposition or advancement of catheter
* loose sutures

3.3 If the patient reports hearing gurgling or flow stream or odd sensations during infusion, let the most responsible health practitioner know right away. This may indicate CVAD malposition.

3.4 Site should be assessed every shift, pre-infusion, during infusion and immediately post-infusion.

3.5 Assessment requires observation and palpation of insertion site up the catheter route.

3.6 Report any of the above to the most responsible health practitioner.

3.7 Daily assessment of line necessity

3.7.1 Risk of CLABSI increases with the duration of time the catheter is left in place, so evaluation of the continued need for a catheter is an important aspect of CLABSI prevention.

3.7.2 Catheters that are no longer needed should be promptly removed.

3.7.3 Daily review of the continued need for CVADs can be done during multidisciplinary patient care rounds or by using reminders, such as stickers on patient records or order sets, or via automated computer alerts.

4.0 MAINTAINING THE CATHETER

4.1 Proper maintenance of CVADs is essential for continued patient safety.

4.1.1 The external surface of a catheter hub, connector, or injection port is the immediate portal of entry of microorganisms to the intraluminal surface of the catheter. Microorganisms entering the system attach at any point of contact along the intraluminal surface. The colonizing organisms form within the needleless connector, catheter hub, and lumen and can be dispersed into the bloodstream, resulting in CLABSI. **It is critical, therefore, that these surfaces be thoroughly disinfected with chlorhexidine/alcohol wipe before they are accessed. Scrub the hub for 15 seconds and allow solution to dry completely. If any blood noted within the needleless connector it must be changed.**
5.0 NEEDLELESS CONNECTOR CHANGE

5.1 Wear mask and protective gloves. When opening the system, air embolism is avoided by placing the patient supine, clamp the lumen (with slide clamp located on lumen pigtail), and cleanse cap/catheter connection with 2% chlorhexidine 70% alcohol swab for 15 seconds. Then ask patient to perform Valsalva Manoeuvre (or hold his/her breath). Using no touch technique, remove the old needleless connector and replace with a new sterile needleless connector.

Note: ALL needleless connectors require priming prior to attaching to CVAD. Make the connection as the patient holds his/her breath or during exhalation. If patient is unable to follow directions, perform on exhalation.

5.2 Change needleless connectors as per Vascular Access Device Quick Reference Protocol or if removed, soiled, broken or blood in connector.

6.0 FLUSHING AND LOCKING

6.1 Don non-sterile gloves. Scrub the hub and allow the needleless connector to completely dry. Ensure catheter patency by using a 10 mL syringe with NS to instil 1-2 mL of NS using positive pulsing pressure. Aspirate for brisk blood return prior to flushing the remainder of the NS. The catheter should flush without resistance or leaking from insertion site. If resistance is met, notify the most responsible health practitioner.

6.2 Flush with preservative free saline for injection to clear the line of medications prior to locking. When flushing, use “Positive Pulsing Pressure” by giving short jerky pushes on plunger.

6.3 If unable to obtain blood return or if there is resistance to flushing the nurse should take further steps to assess patency (eg. is the clamp off?). Report withdrawal occlusion as soon as possible because this is the optimal time to manage occlusions. All complete occlusions should be managed or the catheter removed and replaced if still necessary. Refer to Corporate Policy #VII-B-335, Occlusion Management of Central Venous Catheters. Immediately communicate the
suspected occlusion to the most responsible health practitioner who can initiate appropriate patient care and document who you’ve notified.

6.4 Do not administer vesicant solutions or medications if unable to aspirate blood. Catheters that experience withdrawal occlusion may require occlusion management or Venography to ensure patency. Notify the most responsible health practitioner. Assess patient acuity and document the plan for managing the occlusion or if alternate access is required.

6.5 Frequency of flushing:

20 mL saline flush
- After blood sampling
- Before and after blood component administration
- Prior to drawing drug levels

10 mL saline flush
- When converting from continuous to intermittent therapies
- Before and after intermittent medication therapy to avoid drug incompatibility.
- For maintenance of dormant CVADs.

6.6 Inject locking solution slowly over 3-5 seconds

6.7 The volume should be at least twice the volume capacity of the catheter lumen plus the priming volume of all add-on devices (eg. extension tubing). Flush with a minimum of 10 mL of normal saline.

6.8 Maintain the patency of each unused lumen by locking the each lumen each lumen post infusion, and as per Vascular Access Device Quick Reference Protocol

Locking solutions, in order of preference are:

1. 3 mL sodium citrate 4%
2. 5 mL of heparin lock solution (10 units/mL) or, if not available,
3. 3 mL heparin lock solution (100 units/mL)

6.9 To maintain the patency of catheters locked between medications follow SASS or SASH:
- Saline to assess catheter patency
- Administration of medication
- Saline to flush medication out of catheter
- Sodium citrate or Heparin Lock to maintain patency between medications.

6.10 Clamp the catheter when not in use with the slide clamp provided. Vary position of slide clamp along lumen to prevent wearing of catheter lumen. If catheter has a clamp, it must be clamped when not in use.

6.11 Ensure administration set (tubing) connection is protected with a new sterile end cap after each infusion.

6.12 If heparin locking platelet count monitoring is recommended for post-op patients every 2-3 days from day 4-14, or until therapy with heparin is stopped.
6.13 Refer to Corporate Policy #VII-B-330, Maintenance of I.V./Hypodermoclysis Equipment for equipment change times.

**NURSING ALERT:** If IV solution does not readily infuse or lumen cannot be locked without meeting resistance, DO NOT apply force in attempt to free catheter of clot that may have formed. Occluded catheters increase the risk of catheter related blood stream infections. Notify most responsible health practitioner to consider restoring patency to occluded lumen or to replace catheter.

### 7.0 DRESSING CHANGE TECHNIQUE / PRINCIPLES

7.1 A clean and dry dressing at the insertion site is important to protect the site and to minimize the risk of infection. There are generally two types of dressings that can be used to cover and protect the insertion site:

a) Sterile gauze and sterile tape. If the patient is diaphoretic or the insertion site is oozing blood, gauze dressings are recommended or if any irritation from cleanser and site is red and blistered DO NOT use CLEANSING AGENT UNTIL IRRITATION IS CLEARED.

b) Sterile, semipermeable “transparent” polyurethane dressings. Transparent dressings permit continuous visual inspection of the insertion site, help to secure the device, and do not need to be changed as often as gauze and tape dressings.

7.2 **Dressing Change Equipment**
- Sterile dressing tray
- Clean gloves
- Mask
- Sterile gloves
- Chlorhexidine 2% /alcohol 70% swab sticks – 3 or more as appropriate
- Sterile skin barrier film (e.g. Cavilon™ No Sting Barrier Film)
- Dressing – use as many as required to ensure a minimum of 1-inch (or 2.5 cm) around insertion site and to cover the entire external portion of catheter, and catheter hub. Dressing choice may be a transparent film dressing or transparent film which contains chlorhexidine/antiseptic components as appropriate for your area and the central vascular access device you are covering. Try to minimize the amount one dressing overlaps another dressing.

7.3 **Dressing Removal and Dressing Change Procedure:**

7.3.1 Chlorhexidine 2% alcohol 70% cleanser is the cleanser of choice unless allergy is suspected.
7.3.2 Ensure working surface is cleared and disinfected prior to dressing change. Remove gloves and wash hands.

7.3.3 Perform hand hygiene. Set up sterile tray. Open sterile dressing tray and aseptically add dressing supplies (including sterile gloves) to the dressing tray, being careful to keep all supplies sterile. Note that the chlorhexidine swab stick and barrier film swab stick packages may be opened and arranged at the edge of the sterile field or sterile forceps may be used to transfer stick to sterile tray so they may be easily retrieved.

7.3.4 Perform hand hygiene. Don mask and gloves. Remove dressing gently and carefully by supporting the skin and the catheter with your fingers and either stretching the dressing laterally to break the adhesive, or gently peeling back the dressing by folding the dressing back over itself. Do not pull the dressing up from the skin because this may cause epidermal or skin stripping. Remove dressing from the hub towards the exit site. (Search Google for product information - eg. "Removing 3M “Tegaderm™” Transparent Film and Removing Tegaderm™ IV Advanced Securement dressing", etc.)

To aid in lifting a dressing edge, a piece of tape may be used in a corner. Remove and discard gloves.

7.3.5 Don sterile gloves and use a 4x4 sterile gauze to pick up the end caps and prevent contamination of sterile gloves. Cleanse skin from insertion site outwards using a grid pattern until entire surface under the dressing is cleansed.

7.3.6 With a new swab stick (a minimum of three swab sticks will be required for each dressing change), cleanse along the external catheter length that will be under the dressing. Cleanse using a back and forth, and up and down (grid pattern) motion with gentle friction for a minimum of a 30 seconds to kill bacteria on and within the top layers of the skin. Ensure the entire area that will be under the dressing is cleansed.

7.3.7 The area must air dry completely prior to applying any other product according to manufacturer guidelines. A minimum 2-3 minutes drying time is required but may be much longer on humid days or if preparations that do not contain alcohol are used. Applying barrier film or adhesives when the antiseptic solution is still wet results in skin irritation and potentially can cause a chemical burn. Let all skin antiseptics and barrier films air dry - do not wave hands, blow on area or dry area with sterile gauze. This does not allow for the disinfectant to kill all bacteria on the skin if wiped away.

7.3.8 Always ensure you wear sterile gloves prior to touching any part of the newly cleansed catheter or skin. Sterile gauze may be used to protect your sterile gloves.

7.3.9 Apply sterile skin barrier film (e.g. Cavilon™ No Sting Barrier Film) onto the skin, avoiding a 1 cm area around the insertion site. Except for the area immediately around the insertion site, all skin that will be covered by the dressing should be painted with the skin barrier film. Ensure that the barrier film is completely dry before applying the dressing.

- **Exception:** If using a Tegaderm™ CHG IV Securement Dressing or Biopatch™, do not use a barrier film to the area of antimicrobial delivery in order to allow penetration of the chlorhexidine product. The chlorhexidine impregnated area should cover the insertion site and sutures if any.
7.3.10 Position dressing loosely over the exit site and catheter then apply pressure at the exit site and over the catheter to establish adhesion to the skin and catheter. Note: Do not stretch the transparent film while applying the dressing because this may cause skin stripping and/or blister formation at the dressing edges.

7.3.11 Label site with your initials, and date that you changed the dressing.

7.3.12 Change dressings as per Vascular Access Device Quick Reference Protocol, or if soiled, damp, or loose. Initial dressing upon insertion with gauze must be changed 24 hours post insertion unless orders suggest otherwise.

7.3.13 Do not EVER use scissors as the CVAD catheter may be accidentally cut.

8.0 PATIENT TEACHING

8.1 To prevent air embolism, perform the Valsalva Manoeuvre or hold their breath whenever the catheter is open to air; examples are:

* catheter insertion
* needleless connector changes
* catheter removal (done by qualified health care professionals)

8.2 Report any of the following symptoms:

* pain/tenderness or swelling at site, neck or shoulder
* unexplained shortness of breath, coughing
* chest pain, palpitations
* fever
* tingling finger or shooting pain down arm
* ear pain or “gurgling” in ear

9.0 DOCUMENTATION

9.1 Patient Care Record

* integrity of site
* complications of indwelling catheter
* interventions
* status of infusion
* needleless connector and dressing changes, observation of insertion site, sutures / catheter securement device
* tubing changes

9.2 Fluid Therapy Record

* volume and type of solution
* initiation and discontinuation of therapy
9.3 Medication Administration Record (MAR)
   * record locking solutions medication/blood product administration

9.4 Kardex if applicable
   * dates of planned equipment changes

### 10.0 REMOVAL OF CATHETER

10.1 RNs may **not** remove a central vascular access device that penetrates a heart valve.

10.2 Catheters may be removed by a qualified health care professional educated in CVAD removal.
   - Each patient care area shall identify how often education shall be repeated / competency in CVAD removal validated, dependent on the frequency the skill is performed, and the patient population in the area.
   - In non-critical care areas, RNs identified by the Unit Supervisor or Patient Care Manager may be certified to remove non-tunneled CVAD for femoral, subclavian or jugular sites.
     - Unit Supervisor/Patient Care manager shall keep of list of staff who have been identified to remove CVADs and who have demonstrated competency. The staff member shall be given written documentation that they are allowed to perform this task.

10.3 An order is required to remove a short term CVAD. Check platelet count. Check PT/INR if on anticoagulants. Platelet count less than 50 and prolonged clotting time increase the risk of bleeding. In these cases, consult the most responsible health practitioner before removal of CVAD. Ensure all IV medications/ solutions are discontinued by the prescriber, or that alternate IV access has been established.

10.4 Explain procedure to patient.

10.5 Check chart for order.

10.6 The nurse removing the catheter should be prepared to initiate emergency measures as needed. Complications of removal include, but are not limited to:
   - Air embolism
   - Catheter embolism
   - Pulmonary embolism
   - Excessive bleeding

10.7 Wash hands. Apply mask. Apply protective gloves.

10.8 Verify patient identity using two identifiers.
10.9 Remove dressing as per steps in section 7.0. Inspect exit site.

**NURSING ALERT:** If purulent drainage at exit site, cleanse site with normal saline then obtain swab for C&S from exit site. If purulent drainage is noted at exit site or systemic infection is suspected, following removal, cut approximately 5 cm of catheter tip with sterile scissors, while not allowing tip to touch skin. Place tip in sterile container and send to lab for C&S label accordingly.

10.10 Cleanse exit site with chlorhexidine swab. Remove the sutures.

10.11 Position the patient Trendelenburg if respiratory status allows, if not use the supine position. Ask the patient to perform the Valsalva manoeuvre if able to co-operate. If unable to perform Valsalva, withdraw catheter as the patient holds his/her breath or upon exhalation. Stop if resistance is encountered, and advise prescriber.

10.12 Place first two fingers of non-dominant hand lightly above catheter-skin junction site with gauze between fingers. Have patient perform Valsalva and using gentle even tension slowly retract the catheter in a continuous motion from site with dominant hand while holding site with gauze. If resistance or complication occurs, discontinue removal and notify the most responsible health practitioner.

10.13 Using a sterile gauze, apply manual pressure to the catheter site until haemostasis is achieved and/or the patient is no longer bleeding from the site. Depending on the CVAD you are removing, clotting factors and the type of CVAD, direct digital pressure may be required for significantly longer periods.. Eg. femoral jugular lines or hemodialysis lines require direct digital pressure for 10+ minutes. Have patient perform Valsalva manoeuvre, hold breath, or exhale when gauze removed to assess site for bleeding.

10.14 Assess integrity of catheter to ensure entire catheter is removed.

10.15 **Apply airtight/occlusive dressing.** The dressing should remain in place for 24 hours. If skin has not epithelialized, re-apply dressing daily until skin is healed over.

Examples of occlusive dressings are:
- petroleum impregnated gauze (adaptic) and occlusive dressing.
- Petroleum /antiseptic ointment & Gauze and Comfeel® Plus™ /DuoDERM™ Extra thin
  Note: Gauze and transparent dressing alone is not airtight.
- Change dressing daily until site epithelialized.

10.16 Bed rest should be maintained for a minimum of 30 minutes to reduce the risk of bleeding post removal. Advise the patient not to do any lifting or bathing in this time period.

10.17 If catheter related blood stream infection is suspected, cleanse site prior then place sterile drape (from dressing tray) in close proximity to catheter-skin junction. Remove catheter avoiding contact with surrounding skin. Using aseptic technique cut 5 cm. of the catheter tip with sterile scissors and place in a sterile specimen container. Label with "CVAD", patient name, time, initials and send to the lab for culture and sensitivity.

10.18 Observe the patient for signs and symptoms of insertion site bleeding and air embolism or pulmonary embolism (sudden onset of chest pain, dyspnea, unequal breath sounds, decreased O₂
saturations, cyanosis, hypotension, weak pulse, decreased LOC, churning murmur over precordium).

10.19 Document removal procedure in patient record, indicating catheter integrity, if a swab or catheter tip was sent for culture, site appearance, dressing applied, patient tolerance and if any difficulties during removal were encountered.

10.20 If any problems are encountered notify the most responsible health practitioner.
### 11.0 COMPLICATIONS

<table>
<thead>
<tr>
<th>COMPLICATION</th>
<th>SIGNS &amp; SYMPTOMS</th>
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| AIR EMBOLISM       | * coughing, chest pain, respiratory distress, short of breath  
                     * cyanosis  
                     * altered level of consciousness | * stop infusion(s)  
                     * clamp or pinch catheter (above damaged area)  
                     * patient to lie on left site in Trendelenberg position  
                     * begin resuscitation procedure if required. Notify most responsible health practitioner  
                     * administer O₂ monitor V/S | * Always clamp catheter before opening. Have patient perform Valsalva Manoeuvre.  
                     * Remove all air from tubing and syringes.  
                     * Use leurol lock connections - ensure they are tight.  
                     * Have non-toothed clamp available. |
| ARTERIAL PUNCTURE  | * pulsating blood return  
                     * respiratory distress  
                     * massive hematoma with tracheal compression  
                     * blood backing up into tubing during infusion | * apply pressure over puncture site  
                     * begin resuscitation procedures if required  
                     * notify most responsible health practitioner immediately  
                     * portable CXR (ordered) | * Occurs inadvertently during insertion. |
| BRACHIAL PLEXUS INJURY | * tingling of fingers, pain shooting down arm and/or paralysis | * notify most responsible health practitioner | * Occurs inadvertently during insertion. |
| CATHETER OCCLUSION | * Unable to aspirate blood – withdrawal occlusion  
                     * unable to inject or infuse solution – total occlusion  
                     * leaking of fluid or blood from insertion site | * attempt to aspirate then attempt to flush the catheter (do not apply force when flushing)  
                     * notify most responsible health practitioner  
                     * manage the occlusion or remove catheter | * Use positive pulsing pressure when flushing/locking  
                     * Flush/lock lumens at recommended intervals.  
                     * Clamp catheter when not in use. |
| DAMAGED CATHETER   | * leaking of fluid or blood at damaged area  
                     * swelling of chest area | * stop infusion  
                     * do not use catheter  
                     * clamp catheter with a non-serrated clamp proximal to the damaged area  
                     * notify most responsible health practitioner | * Never use scissors or sharp objects around catheter.  
                     * Use 10 mL syringes when flushing to prevent catheter rupture.  
                     * Never use force when flushing.  
                     * Unclamp before flushing.  
                     * Keep catheter securely taped.  
                     * Vary position of clamps along lumen.  
                     * Do not use safety pins attached to tape to secure catheter to patient gown. |
| INFECTION          | * redness, pain, warmth, swelling around exit site, drainage  
                     * Dressing wet with pus, blood or fluid  
                     * fever and chills | * do not use catheter  
                     * notify most responsible health practitioner immediately  
                     * Obtain simultaneous blood cultures | * Wash hands well with alcohol based hand sanitizer and wear protective gloves before handling catheter or... |
### Care and Removal of Central Vascular Access Devices – Non-tunnelled

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<th>COMPLICATION</th>
<th>SIGNS &amp; SYMPTOMS</th>
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<td>from a peripheral site and <strong>each lumen</strong> of the CVAD.</td>
<td>equipment.</td>
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<td><strong>Maximum barrier precautions at insertion</strong></td>
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<td><strong>Strict aseptic technique.</strong></td>
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<td><strong>Change dressings and equipment according to procedure and prn; i.e. soiled, loose, damp.</strong></td>
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<td><strong>Minimize accessing catheter.</strong></td>
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<td><strong>Remove catheter when therapy complete</strong></td>
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<td>MALPOSITION</td>
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<td>* difficulty with aspiration or infusion</td>
<td>* do not use catheter</td>
<td><strong>Ensure catheter and tubing taped securely.</strong></td>
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<td>* discomfort in sound, neck or arm</td>
<td>* inform most responsible health practitioner</td>
<td><strong>Ensure sutures remain secure.</strong></td>
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<td>* edema of neck or shoulder or arms/hands</td>
<td>* CXR</td>
<td><strong>Monitor catheter insertion length each shift and prn.</strong></td>
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<td>* longer external length</td>
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<td>* ear “gurgling” sound described during infusion</td>
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<td>* arrhythmias (if in right atrium)</td>
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<td>HEMOTHORAX PNEUMOTHORAX</td>
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<td>* mild to severe dyspnea and/or chest pain</td>
<td>* notify most responsible health practitioner immediately</td>
<td><strong>Occurs inadvertently during insertion.</strong></td>
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<td>* delayed symptoms include tachycardia, hypotension, cyanosis, diaphoresis and hemoptysis</td>
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<td></td>
<td>* tracheal deviation</td>
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<tr>
<td>PERICARDIAL TAMPOANADE</td>
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<td></td>
<td>* hypotension</td>
<td>* notify most responsible health practitioner immediately</td>
<td><strong>Occurs inadvertently during insertion.</strong></td>
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<tr>
<td></td>
<td>* neck vein distension</td>
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<tr>
<td>THROMBOSIS</td>
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<td></td>
<td>* upper chest pain, jaw pain, ear ache, neck pain</td>
<td>* notify most responsible health practitioner</td>
<td><strong>Monitor for signs and symptoms and report.</strong></td>
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<tr>
<td></td>
<td>* swelling of arm, neck and shoulder on same side a catheter</td>
<td></td>
<td><strong>Avoid trauma or movement of catheter.</strong></td>
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<td>* sluggish flow of IV solution</td>
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<tr>
<td>COMPLICATION</td>
<td>SIGNS &amp; SYMPTOMS</td>
<td>ACTION</td>
<td>PREVENTION</td>
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</table>
| SUPERIOR VENA CAVA SYNDROME          | * progressive shortness of breath, dyspnea, cough, chest skin tightness; unilateral edema, cyanosis of face, neck, shoulders and arms; jugular, temporal and arm vein distension | * notify most responsible health practitioner immediately at first signs and symptoms  
  * place in semi-Fowlers position and start oxygen at 2 L/min.  
  * provide emotional support  
  * monitor cardiovascular and neurologic status | * Monitor for signs and symptoms. |
| CATHETER PINCH-OFF SYNDROME          | * intermittent catheter occlusion that is relieved by postural change  
  * weak point on the catheter “balloon out”  
  * difficult to aspirate blood  
  * resistance to flushing or infusion with catheter fracture  
  - intraclavicular pain  
  - palpitation, chest pain | * notify most responsible health practitioner  
  * do not use catheter  
  * x-ray confirmation  
  * contrast dye study via catheter to rule out partial transection of catheter  
  * can result in complete or partial catheter transection and catheter embolization | * Can not be prevented. |