LEARNING MODULE
FOR

CARE OF THE NON-TUNNELLED HEMODIALYSIS CENTRAL VENOUS CATHETER
(ACCESSING, DRESSING CHANGES, BLOOD SAMPLING AND REMOVAL)

POST ENTRY LEVEL COMPETENCY FOR RNS
(CC 50-049)

Developed: June, 1998
Revision Date: April 2014

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RN LEARNING OBJECTIVES & METHOD

Following the completion of this learning module, the RN will:

1. Discuss the indications for use of the non-tunnelled hemodialysis CVC.
2. Discuss the initial nursing assessment of the catheter and insertion site.
3. Demonstrate the ability to assess patency, flush catheter lumens, withdraw blood, instill lock solution, perform Tego® or luer lock cap and dressing changes.
4. Discuss complications associated with the non-tunnelled hemodialysis CVC and nursing actions to prevent and treat these complications.
5. Discuss required patient teaching components in relation to the tunnelled hemodialysis CVC.

In order to be deemed competent in the care of the non-tunnelled hemodialysis CVC, the RN must:

1. Review the Policy and Procedure & Learning Module associated with the non-tunnelled hemodialysis CVC.
2. Complete the self-test.
3. Practice the procedures and demonstrate skills to clinical educator, preceptor or delegate.
4. Maintain a record of competence.
5. Conduct a yearly self-assessment of competency level and develop a plan in conjunction with the unit manager to meet ongoing needs.

PURPOSE:

The RN will demonstrate knowledge of the theory and skills related to the nursing care of the non-tunnelled hemodialysis catheters.

THEORY:

1. The non-tunnelled catheter is a double-lumen catheter with arterial (denotes the lumen used to remove blood during the dialysis treatment) and venous (denotes the lumen that is used to return the blood back to the patient during the treatment) lumens, which allows access to the patient’s venous blood supply during the hemodialysis therapy. Each lumen has a luer-lock connection that fits the blood tubing used for hemodialysis treatments. The catheter is inserted into the internal jugular (preferred site), subclavian or femoral vein to provide vascular access for hemodialysis. Non-tunnelled catheters are inserted for some of these reasons:

   1.1. Acute renal failure patient requiring hemodialysis
1.2. Chronic renal failure patient with an immature or failed AVF/Graft access, requiring temporary access for hemodialysis

1.3. Renal transplant patient requiring limited hemodialysis therapy

When the line is placed, a CXR must be done to confirm position and to check for complications such as a pneumothorax. (See complications below for S&S of a pneumothorax.)

2. Each time a catheter is used, it is assessed for the following:

   2.1. Catheter lumen volumes, size, integrity and patency
   2.2. Kinks
   2.3. Suture integrity
   2.4. Insertion site (presence of redness, drainage etc.)

**Complications of catheter placement and continued use are:**

**Pneumothorax**

A patient may develop a pneumothorax (air in the pleural space) following the insertion of a catheter. Signs and symptoms of a pneumothorax are: tachypnea, dyspnea, anxiety, tachycardia, chest pain and diminished breath sounds. This should immediately be reported to the physician.

**Infection**

The potential for exit site infection, CVC related bacteremia and sepsis makes adherence to aseptic, no touch technique imperative during catheter insertion, dressing changes, TEGO connector cap changes, accessing and catheter removal. The most common sources of infection are skin microorganisms and the catheter lumens. Other potential causes include: migration of skin flora up the catheter tract and/or CVC bifurcation, hematogenous seeding from another site of infection, catheter related thrombus and rarely contaminated infusate. When performing catheter care it is important that the catheter or catheter lumens do not touch the skin as this increases the chance of infection from skin organisms. Sterile gloves and a mask (for nurse and patient) are used during catheter care. 2% chlorhexidine gluconate/70% isopropyl alcohol is the preferred skin antiseptic for hemodialysis catheters and exit site care. This is due to its rapid and persistent antimicrobial activity (up to 48 hours). In an effort to achieve maximal effectiveness the solution must be applied to the skin using friction to the skin and cleaning in a horizontal (side to side) plane extending 5cm from the catheter exit site, then cleaning in a vertical (up and down) plane, then cleaning the skin beginning at the insertion site with a circular motion (middle to outward) extended in a 5cm radius for 30 seconds, with up to 2 minutes drying time. In the event of skin sensitivities to the preferred skin antiseptic, the recommended alternative is to use 0.5% chlorhexidine/70% Isopropyl alcohol gel followed by povidone-iodine solution to cleanse the skin.
The sterile occlusive dressing is changed three times per week or anytime the dressing is loose and/or wet. Luer lock caps are to be changed every 48-72 hours or if the line is accessed (i.e. for blood sampling). TEGO connectors have been introduced for use with hemodialysis catheters. The TEGO connector is a closed system device that potentially can reduce the risk of catheter related infections resulting from repeat opening and manipulation of the CVC lumen(s). TEGO connector caps are to be changed every 7 days and prn.

Signs and symptoms of infection may include elevated temperature (although this symptom may be absent), elevated WBC's, site discomfort, redness, swelling and/or drainage. These signs and symptoms must be reported to the physician or NP. The exit site is to be swabbed for C&S. Blood cultures (via the catheter and peripheral) may be ordered prior to initiating antibiotic therapy and a catheter change may be indicated.

CVC related infections are associated with significant morbidity, mortality and treatment costs. Since 2002, there have been several studies addressing the benefits of using antibiotic and heparin lock solutions to help prevent/reduce catheter related infections. However, relatively few clinical trials have addressed the overall efficacy and most effective concentration of gentamicin. Therefore, gentamicin levels and resistance to gentamicin should be monitored when this CVC locking approach is used.

**Thrombosis or Catheter Dysfunction**

Flushing of the hemodialysis CVC is required to prevent or delay catheter occlusion related to fibrin formation or drug precipitate. This is accomplished by withdrawing 5 mL of discard blood from each lumen (to remove the locking solution from the lumen) and flushing of the catheter lumens with 10 mL of 0.9% normal saline followed by instillation with locking solution. The preferred locking solution is 4% sodium citrate. (Heparin or alteplase may be ordered by physician or NP.) The flushing and locking of the CVC is required q 48-72 hours (usually performed post hemodialysis). and whenever the catheter is accessed (i.e. drug administration; blood sampling). When TEGO connector is **not in use**, positive pressure is to be used, to prevent the backflow of blood into the catheter, which could lead to clotting of blood in the catheter lumen and at the tip of the catheter.

**Methods to Maintain Positive Pressure**

- Close the clamp as the last 0.5mL of solution is injected (**when TEGO connector not in use**).
- Close the clamp to IV tubing (i.e. if giving antibiotics) before closing the catheter lumen clamp (**when TEGO connector not in use**).
- Post dialysis- administer blood back to patient by attaching the saline line to the arterial bloodline and allowing the blood pump to return the blood.

**Venous Air Embolism:**

To prevent venous air embolus and decrease the risk of infection, open the system only when it is absolutely necessary. Lines must always be clamped when they are not in use. All lines must be clamped before the system is opened.

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To prevent venous air embolism, an airtight dressing such as Vaseline gauze or betadine ointment/gauze and an occlusive dressing must be applied post catheter removal until the catheter exit site has healed or scabbed over, to prevent venous air embolism.
### SIGNS AND SYMPTOMS

**Bleeding from the catheter exit (insertion) site**
- Excessive bleeding for more than 24-48 hours after insertion is unusual.

### POSSIBLE CAUSES

Bleeding may occur if the patient:
- Has some form of coagulopathy.
- Is on an anti-coagulant.
- Is taking over the counter medications which affect platelet count.
- Has undergone a traumatic insertion procedure.
- Has been extremely active post insertion.
- Use of a large bore catheter.
- Use of a catheter made of non-flexible material.
- Has had heparin instilled post insertion or catheter exchange. The heparin may have been infused systemically.

### NURSING ACTIONS

Identify the source of the bleeding (is it the insertion (exit) site).

If bleeding is excessive, notify the physician or NP. The CVC may have to be removed and direct pressure applied to the insertion site.

If bleeding occurs immediately post insertion, apply sterile gelfoam and gauze (using aseptic technique) to the bleeding site (if it is the insertion site that is bleeding). A suture may be required at the site of bleeding. DO NOT leave gelfoam on bleeding site after bleeding has resolved (potential source of infection if left on site for a prolonged period of time).

More frequent dressing changes as well as mild pressure may be needed to control bleeding.

A PTT may be ordered if the heparin has been administered systemically.

### PREVENTION

Thorough patient assessment to determine the presence of factors which may cause bleeding post insertion (i.e. bleeding disorders, abnormal clotting blood levels).

Careful venipuncture technique performed by a competent clinician.

The preferred locking solution is 4% sodium citrate.

Ensure 4% sodium citrate or heparin 1000 units/mL is ordered for instillation of lumens for at least the first three catheter access procedures following a catheter insertion or a catheter exchange. Do not overfill the catheter lumens (instil the correct amount of anticoagulant as per the lumen volume).

Rationale: 4% sodium citrate does not cause systemic anticoagulation effects as compared with heparin. As well, there is little evidence in the literature to support the practice of catheter lumen overfill as a means to prevent lumen dysfunction. Furthermore, attempts to locate literature refuting the use of 4% sodium citrate or heparin 1000 units/mL
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<td>for newly inserted or exchanged catheter lumen instillation has not been located. Incorporation of these practices (no overfill; 4% sodium citrate or heparin 1000 units/mL use) should help reduce the chance of significant interdialytic systemic heparinization and associated bleeding complications.</td>
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| Catheter related bacteremias – elevated temperature may or may not be present, increased pulse, chills, malaise, drainage or redness from the insertion site, elevated white blood cell count. | Infection present in the catheter and blood most commonly caused by coagulase-negative staphylococci, staphylococcus aureus, aerobic gram-negative bacilli and candida albicans. (Mermel, 2001) Contamination of the catheter lumens leading to colonization of the lumen interior is the most common route of infection. (Mermel, 2001)  
*The decision to remove the catheter depends upon the causative organism, the type of catheter and the condition of the patient.* | Monitor patient for signs of infection (i.e. increased temperature, chills).  
Notify the physician or NP. A topical antibiotic ointment may be prescribed for the exit site if the exit site is reddened and draining.  
The physician or NP may order 2 sets of blood samples for culture and sensitivity, one from the line and one peripherally. If drainage is noted from insertion site - send a swab for culture and sensitivity.  
If the CVC is removed, send catheter tip (with an order) for Culture and Sensitivity (C & S).  
Two modes of treatment prescribed by the physician or NP:  
(1) Leave catheter in place, treat with antibiotics  
(2) Treat with an initial dose of antibiotics, remove the catheter, insert another catheter (different site or exchange over guidewire). | Use aseptic technique during all aspects of care.  
Wash hands thoroughly with antibacterial soap or alcohol based hand rub (ABHR) and wear gloves and mask before caring for the CVC or dressings.  
Access and change dressings, and adapters as outlined in Nursing Policy and Procedure.  
The use of antibiotic locking solution (example heparin/gentamicin solution).  
Rationale: CVC related infections are associated with significant morbidity, mortality and treatment costs. Since 2002 there have been several studies addressing the benefits of using antibiotic and heparin lock solutions to help prevent/reduce catheter related infections. It is unclear from the available literature which antibiotic and what concentration of antibiotic is most effective. *If gentamicin is ordered, gentamicin levels and resistance to gentamicin* |
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<td><strong>Catheter tip migration</strong> - referred pain in the jaw, ear or teeth; - distended veins on the side of the central venous catheter; - the length of the catheter from the insertion site is lengthened. - pain during infusion or flushing. - sluggish drip rate during infusion. - inability to aspirate blood. - dyspnea, cyanosis, chest pain, hypotension and shock.</td>
<td>Movement of the catheter either internally or externally. The catheter may become looped, tip may move out of the correct location, the tip may erode the vasculature or myocardium. Some movement of the tip is normal with changes in the patient’s position, however misdirected hemodialysis treatment, fluid infusions may lead to cardiac tamponade, extravasation, pleural effusions and death. Patients at an increased risk include: Patients who experience frequent nausea and vomiting, patients who are physically active, patients who have severe bouts of coughing and patients with left sided catheters. A pull on the CVC could cause dislodgement of the catheter.</td>
<td>Measure the initial length of the catheter (measure from insertion site to end of catheter hub at the bifurcation) post insertion and document in the nursing kardex. Assess for signs and symptoms of catheter migration (see signs and symptoms). Teach the patient to observe for these and notify RN if present. If these are present, notify the physician or NP. An x-ray to verify catheter tip placement may be required. <strong>Do not attempt to reinsert</strong></td>
<td>Medicate conditions which could cause nausea and vomiting, severe bouts of coughing. Teach patients to avoid pulling on the catheter or engage in activities, with a lot of upper body movement which could dislodge the catheter. Proper insertion technique.</td>
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<td>Occlusion/Dysfunctional CVC:</td>
<td>Catheter lumen or hemodialysis line clamped.</td>
<td>Check all tubing/ lines and hemodialysis CVC for kinks - correct kinks if present.</td>
<td>Verify CVC locking solution. Preferred locking solution is 4% sodium citrate.</td>
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<td>Inability to aspirate blood and/or flush catheter lumen or sluggish blood return.</td>
<td>Precipitate or clot in hemodialysis bloodline or CVC lumen.</td>
<td>Check clamps to see if closed - release if closed.</td>
<td>Rationale: There have been a few small studies and one large study comparing heparin 5000 units/mL to 4% sodium citrate. These studies, for the most part, demonstrated that citrate was comparable to heparin in terms of maintaining catheter patency. Additionally, a prospective cohort study concluded that the use of citrate for CVC lumen locking has equivalent or better outcomes in terms of alteplase use, need for CVC exchange and access-related hospitalizations when compared with heparin.</td>
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<td>High venous and arterial dialysis pressures during therapy.</td>
<td>Dressing or suture placed too tightly.</td>
<td>Check to see if dressing is too tight over the catheter.</td>
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<td>IV medication will not infuse.</td>
<td>Catheter tip lying against the side of the vessel wall.</td>
<td>If blood return is absent, rule out positional problems by: - Asking the patient to deep breathe, cough and change position - Attach 10 ml syringe and attempt aspiration - Assess TEGO connector for possible dysfunction. -- If these measures are not successful, notify physician or NP.</td>
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<td>Hemodialysis lumen(s), bloodlines, IV tubing or catheter lumen kinked.</td>
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<td>Exceptions for Hemodialysis: - If ordered, RN is to follow Hemodialysis CVC Dysfunction Protocol - Prior to hemodialysis, if unable to aspirate 5 mL of discard blood when the catheter lumens are locked with 4% sodium citrate then the RN may push the sodium citrate into the catheter. The nephrologists or NP will be made aware of this at some point in the patient’s hemodialysis treatment and the dialysis RN (educated in care of the use of the Hemodialysis CVC Dysfunction Protocol) will assess the patient’s catheter for dysfunction and intervene accordingly.</td>
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<td>Clamp on IV tubing closed.</td>
<td>Volume depletion.</td>
<td>Flush CVC with saline before and after medication to prevent clogging from drug precipitates.</td>
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<td>Follow schedules for locking of CVC lumens as outlined in Policy and Procedure for Maintaining Catheter Patency</td>
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<td>If able to withdraw 5 mL of discard blood, draw up 10 mL of normal saline, attach syringe to catheter lumen, aspirate gently for blood return, if blood return confirmed, inject normal saline and attempt to aspirate again. Check IV tubing and CVC for presence of precipitate. Immediately withdraw 6-10mL of blood, flush with 10 mL normal saline and change IV tubing. Assess for volume depletion (low albumin, below ideal body weight, nausea/vomiting).</td>
<td>Use dressing technique as outlined in Policy and Procedure for Dressing Change, to prevent kinking. Ensure dressing or suture is not applied tightly as to occlude the CVC. Be certain to flush after taking blood samples. Do not let IV lines run dry.</td>
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<td>Leaking or Broken catheter:</td>
<td>Blood or fluid leaking from the tunnelled CVC or signs and symptoms of venous air embolism.</td>
<td>If noted -- Have patient hold breath or bear down. Clamp the tubing between the break and the skin. Apply occlusive tape over the tear or hole Notify physician or NP.</td>
<td>Never use any type of clamping device on the CVC. Do not use sharp instruments or scissors during dressing changes. Use 10 mL syringes to prevent too much catheter pressure during flushing or instilling procedures. <strong>Exception:</strong> When using 5 mL pre-filled 4% sodium citrate syringes (as ordered) instil each catheter lumen with the solution over 15 seconds so as to prevent an increase in catheter pressure. Use dressing to secure the CVC.</td>
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<td>Fluid Leaking from the luer lock cap/IV connection of the CVC or from around the hemodialysis bloodline.</td>
<td>Loose tubing connection.</td>
<td>Tighten adaptor and IV tubing or dialysis lines. If CVC was locked the catheter will have to be accessed (withdraw 5 mL of blood), flushed (10 mL of normal saline) and locked again (according to physician or NP's order).</td>
<td>Use luer lock connectors. Ensure luer lock connectors are secured to the catheter lumens of the CVC. Ensure hemodialysis bloodline is secured to the catheter lumens every 1 hour.</td>
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### SIGNS AND SYMPTOMS

| Deep vein thrombosis of the subclavian vein or internal jugular vein -
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<td>- Swelling in the arm, distension of the veins of the arm and neck on the side in which the CVC is located. High venous and arterial pressure during hemodialysis treatment or the IV solution may not infuse and may have pain in the neck, scapula, arm or ear.</td>
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### POSSIBLE CAUSES

- Injury to the intima of the wall of the vein.
- Obstructed blood flow by clot formation.
- Changes in composition of the blood.

### NURSING ACTIONS

- Notify the physician or NP.

### PREVENTION

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### SIGNS AND SYMPTOMS

**Venous Air Embolism**
- Chest pain, dyspnea, tachycardia, cyanosis, decreased blood pressure, nausea, confusion

### POSSIBLE CAUSES

- When 10-20mL of air is trapped in the vein it is carried quickly to the right ventricle. Here it blocks the flow of blood from the ventricles into the pulmonary arteries thus the heart overfills. The right ventricle forcefully contracts in an attempt to eject the blood. However, this causes the air bubble to break into smaller air bubbles, which cause more obstruction and pulmonary hypoxia. Pulmonary hypoxia causes vasoconstriction in the lung. This leads to an even greater workload for the right ventricle. Eventually, left ventricular filling is reduced and cardiac output drops, shock and death rapidly occur.
- May occur on insertion and removal.
- Catheter is punctured.
- Accidental removal of catheter.
- Opening of the system during luer lock cap change.
- Air not removed from IV

### NURSING ACTIONS

- Assess IV system, dialysis bloodlines are secure.
- Clamp the hemodialysis bloodlines and catheter lumens
- Disconnect the patient from the hemodialysis treatment and recirculate the blood.
- If signs and symptoms are noted, place on the left side with feet above the heart (this allows air to enter the right atrium and disperse via the pulmonary artery).
- Notify the physician or NP.
- Monitor vital signs.
- Oxygen by mask is usually required.
- Stay with the patient.
- When removing a catheter, place the patient in Trendelenburg position (if not contraindicated), have the patient perform the Valsalva Maneuver, or hold their breath and bear down, apply firm pressure over the insertion site with a sterile gauze for a minimum of 20 minutes followed by a vaseline gauze or betadine ointment gauze dressing. This enables the tissues to adhere together sealing off an entry path for air. Keep the patient in the Trendelenburg position until the occlusive dressing is applied over the Vaseline or betadine.

### PREVENTION

- Avoid use of instruments which may puncture catheter (i.e. hemostats, scissors, safety pins).
- Ensure hemodialysis bloodlines are free of air and foam and that the venous line is "in situ" correctly.
- Remove all air from IV tubing prior to use.
- When changing luer lock cap or TEGO connectors - close clamp of CVC. Keep the catheter insertion site at or below the level of the heart.
- Advise patient to avoid activities which could dislodge or remove the CVC.
- Closely watch confused patients to ensure they do not disconnect the tubing or dislodge the catheter.
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<td>tubings.</td>
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<td>The CVC is accidentally removed</td>
<td>Accidental pulling on the catheter.</td>
<td>Tell the patient to call immediately for the nurse.</td>
<td>Teach patient to:</td>
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<td>Place gauze over the exit site and hold in place for 20 minutes.</td>
<td>Avoid pulling on the catheter.</td>
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<td>Apply Vaseline or betadine ointment gauze and an air tight dressing.</td>
<td>Not engage in activities which could dislodge the catheter.</td>
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<td>Call the physician or NP.</td>
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<td>Assess for venous air embolism and take nursing actions listed for this if signs are noted.</td>
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<td>At Home, instruct patient to:</td>
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<td>1. Hold breath or bear down as if having a bowel movement until pressure is applied as stated below.</td>
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<td>2. Apply pressure with a gauze, clean face cloth or hand over exit site and hold in place.</td>
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<td>3. Call 911 or have someone take them to the emergency department to be assessed.</td>
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<td>Internal Catheter Fracture - Partial or complete breakage of catheter internally, possibly leading to catheter embolism. Swelling of the chest wall, or feeling of fullness in the chest when IV infusing or during hemodialysis therapy. New chest pain cough or palpitations.</td>
<td>Mechanical friction caused by shoulder movements when catheter is placed in the subclavian vein medial to the mid-clavicular line between the clavicle and 1st rib. May be preceded by catheter pinch off as indicated by difficulty aspirating blood or infusing fluids when patients are seated upright.</td>
<td>Notify the physician or NP. Chest X-ray maybe ordered because it can demonstrate catheter pinch off.</td>
<td>Correct placement in radiology. Teach patients to avoid activities with a lot of shoulder movement. Avoid subclavian vein placement of CVC when possible</td>
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Patient/Family Teaching

1. Patient/family teaching is an important component in the nursing care of patients with hemodialysis catheters. Patients and their families need support during the procedures. In addition, they must be taught to:
   1.1. Report site tenderness, wet or loose dressings and any unusual pain and/or bleeding to the healthcare team;
   1.2. Avoid tugging on the catheter;
   1.3. Discuss any concerns they might have;
   1.4. Care for the catheter dressing. An information pamphlet titled Non-Tunneled Hemodialysis Catheter may be used to reinforce the teaching provided.

Nursing Approach to Patient Teaching

1. Start teaching as early as possible, involve a family member if able;
2. Assess patient’s readiness to learn;
3. Assess most effective method of learning for patient (i.e., pictures, booklet, demonstration, discussion);
4. Design a teaching schedule so others may reinforce and add to what has been taught;
5. Explain procedures in terms appropriate for the individual patient;
6. Consistently evaluate effectiveness of teaching;

REFERENCES:


TEGO Connector (Date?). Directions for Use. ICU Medical Inc.


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SELF TEST

1. Which of the following are indications for insertion of a catheter?

   a) access for hemodialysis patients with poor vascular access
   b) while awaiting AV fistula maturity
   c) for immediate venous access in acute renal failure patients

   1. a  b
   2. a  c
   3. b  c
   4. all of the above

2. Which of the following are signs of pneumothorax - a complication of catheter line insertion:

   a) chest pain
   b) restlessness
   c) decreased pulse
   d) diminished breath sounds

   1. a  b  c
   2. a  b  d
   3. a  c  d
   4. b  c  d

3. Which of the following techniques are used to maintain intrathoracic pressure during catheter insertion, catheter access and catheter removal?

   a) turn patient onto left side
   b) instruct patient to use Valsalva Maneuver or hold breath and bear down
   c) place patient in Trendelenburg position (if not contraindicated)

   1. a  b
   2. a  b
   3. a  c
   4. b  c

4. Which is the preferred routine locking solution to maintain CVC lumen patency?

   1. heparin 5,000 units/mL
   2. 4% sodium citrate
   3. heparin 10,000 units/mL

(Back to LM TOC)
4. heparin 1,000 units/mL

5. How frequent should the catheter lumens be flushed and locked to maintain patency? Every:
   1. 12-24 hours
   2. 24-48 hours
   3. 48-72 hours
   4. 72-96 hours

6. What is the frequency of dressing changes? Every:
   1. 24-36 hours
   2. 36-48 hours
   3. 48-72 hours
   4. 72-96 hours

7. Which of the following are indications that the catheter has migrated?
   a) redness at the exit site
   b) visible migration
   c) burning/painful sensation in the ear or neck
   d) leakage of IV fluids around exit site
      
      1. a b c
      2. a b d
      3. a c d
      4. b c d

8. Upon retraction of the syringe plunger, the barrel fills with foam. What is the most likely cause of this?
   1. sepsis
   2. air embolism
   3. catheter migration
   4. catheter occlusion

9. Your patient is experiencing chest pain and seems confused. What is the most likely reason for this?
   1. sepsis
   2. pneumothorax
   3. air embolism
   4. catheter migration

(Back to LM TOC)
10. With the exception of 5 mL pre-filled 4% sodium citrate syringes, 10 mL syringe or greater must be used when accessing the catheter lumens. Why?

   1. to prevent infection
   2. to prevent catheter migration
   3. to prevent damage to the vessels
   4. to prevent air emboli

11. a) Explain the correct method for attaching a saline flush syringe to a TEGO connector?

b) Explain the correct method for disconnecting a syringe from a TEGO connector?
Answers to Multiple Choice Test

1. 4
2. 2
3. 4
4. 2
5. 3
6. 3
7. 4
8. 4
9. 3
10. 3

11.a) Ensure the lumen clamp is closed. Scrub CVC lumen TEGO connector with 2% chlorhexidine/70% Isopropyl alcohol. Allow to air dry completely. Attach saline syringe by holding TEGO and rotating collar of syringe onto TEGO until it stops (do not over tighten). Open the clamp, verify blood return and flush with 10mL of normal saline.

b) Disconnect syringe from TEGO by grasping TEGO and twisting syringe away from TEGO until loose. Close the lumen clamp.
CAPITAL HEALTH PROFICIENCY SKILLS CHECKLIST

**TITLE: NON-TUNNELLED HEMODIALYSIS CVC DRESSING & TEGO CONNECTOR**

<table>
<thead>
<tr>
<th>Critical Behaviours Performed</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Masks (patient and nurse) and washes hands.</td>
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<tr>
<td>2. Adds supplies to the dressing tray using aseptic technique.</td>
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<tr>
<td>3. Puts on clean gloves and removes old transparent dressing. Tries to minimize pulling or tugging of the dressing at the CVC insertion site.</td>
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<tr>
<td>4. Opens gauze around the CVC lumens. Places sterile 4 x 8 under the lumens and exit site while removing the old gauze dressing and places another sterile 4 x 8 on top of CVC.</td>
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<tr>
<td>5. Using 2% chlorhexidine gluconate/ 70% Isopropyl alcohol scrubs (for a minimum of 30 seconds) the surrounding skin and under the CVC lumens by carefully lifting up on gauze covered lumens. Allows to dry completely</td>
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<tr>
<td>6. Removes gloves and washes hands.</td>
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<tr>
<td>7. Removes top 4 x 8 gauze from the insertion site. Dons sterile Gloves.</td>
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<tr>
<td>8. Places sterile barrier under the lumens.</td>
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<tr>
<td>9. Scrubs exit site with 2% chlorhexidine gluconate/70% Isopropyl alcohol soaked gauze with friction to the skin and cleanses in a horizontal (side to side) plane extending 5cm from the catheter exit site, then 9.1. cleanses in a vertical (up and down) plane, then. 9.2. cleanses the skin beginning at the insertion site with a circular motion (middle to outward) extended in a 5cm diameter. Allows to dry completely (at least 2 minutes.)</td>
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<tr>
<td>10. Cleans under the wings of the catheter for 30 seconds with 2% chlorhexidine gluconate/70% Isopropyl alcohol using sterile Q-tip or 2 x 2 gauze. Allows to dry completely. 10.1. Wraps and scrubs catheter hub with 2% chlorhexidine gluconate/70% isopropyl alcohol moistened gauze. Removes gauze. Allows to dry completely. 10.2. Wraps and cleans each lumen and TEGO connector cap as step b). Removes gauze. Allows to dry completely. 10.3. Ensures CVC lumen clamp is closed. Then using aseptic technique, remove TEGO connector from CVC lumen and attach new TEGO connector to CVC lumen.</td>
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</tbody>
</table>

(Back to LM TOC)
11. Applies dressing as follows:

11.1. Applies a thin film of Polysporin® triple ointment (as prescribed) around the CVC exit site.

11.2. Places 2 x 2 gauze (opened and folded in half length wise) under the wings of the catheter. Places 2x2 gauzes over exit site.

11.3. Opens 4 x 4 gauze lengthways and places under the catheter lumens. Folds the remainder of the 4x4 over the catheter lumens. Tucks the excess gauze under the catheter lumens.

11.4. Places another 4 x 4 gauze over the exit site and wraps catheter lumens (folded in half length wise).

11.5. Secures entire dressing with occlusive dressings.

12. Dates the dressing change. Documents accordingly.
CAPITAL HEALTH PROFICIENCY SKILLS CHECKLIST

**TITLE: MAINTAINING PATENCY – NON-TUNNELLED HEMODIALYSIS CVC**

<table>
<thead>
<tr>
<th>Critical Behaviours Performed</th>
<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>1. Masks (patient and nurse) and washes hands.</td>
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<tr>
<td>2. Wipes normal saline injection port with 2% chlorhexidine gluconate/70% Isopropyl alcohol swab and uses separate swab to wipe locking solution injection port (as applicable). Allows to dry completely.</td>
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<tr>
<td>3. Sets up tray, aseptically.</td>
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<tr>
<td>4. Applies non-sterile gloves.</td>
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</tbody>
</table>
| 5. Opens gauze around catheter and places sterile 4x8 under lumens and insertion site while removes old gauze. Places sterile 4x8 on top of catheter.  
  5.1. Places prescribed antiseptic on 4x4. Scrubs surrounding skin (minimum of 30 seconds) and under lumens. Allows to dry completely.  
  5.2. Removes gloves, washes hands. Removes 4x8s from catheter lumens  
  5.3. Puts on sterile gloves. Places sterile barrier under lumens. |     |    |
| 6. Scrubs exit site with 2% chlorhexidine gluconate/70% Isopropyl alcohol soaked gauze with friction to the skin and cleanses in a horizontal (side to side) plane extending 5cm from the catheter exit site, then  
  6.1. cleanses in a vertical (up and down) plane, then cleanses the skin beginning at the insertion site with a circular motion (middle to outward) extended in a 5cm diameter. Allows to dry completely (at least 2 minutes).  
  6.2. Applies thin film of Polysporin® triple ointment to exit site. Places 2x2 gauze (opened and folded in half length wise) dressing under the wings followed by 2x2 gauze over catheter exit site.  
  6.3. Applies additional gauze to cover the exit site followed by application of occlusive dressing to exit site. |     |    |
| 7. Aseptically, draws up normal saline X 2 and locking solution X 2 or obtains 4% sodium citrate pre-filled syringes. |     |    |
| 8. Ensures the lumen clamp is closed. Cleans CVC lumen TEGO connector with 2% chlorhexidine gluconate/70% Isopropyl alcohol swab(s) for 15 seconds. Allows to dry |     |    |
9. Attaches sterile syringe by holding TEGO and rotating collar of syringe onto TEGO until it stops (do not over tighten).

9.1. Opens the clamp and withdraws 5 mL of discard blood. Closes the lumen clamp. Disconnects syringe from TEGO by grasping TEGO and twisting syringe away from TEGO until loose.

9.2. Cleans CVC lumen TEGO connector with 2% chlorhexidine gluconate/70% isopropyl alcohol swab(s). Allows to air dry completely.

9.3. Attaches normal saline syringe

9.4. Opens clamp, verifies blood return and flushes with 10mL of normal saline. Closes the lumen clamp. Disconnects syringe

9.5. Attaches syringe containing locking solution, opens the clamp and instills the prescribed locking solution (as outlined in the Maintaining Catheter Patency Procedure). Removes the syringe. Closes clamp.

**Alteplase instillation is performed by RN only.**

10. Repeats steps 8-9 for other lumen.

11. Wraps the catheter lumens with sterile gauze. Applies additional gauze to cover the lumens followed by application of occlusive dressing.

12. Documents accordingly. Labels and dates CVC with locking solution name and dose used for instillation.
**CAPITAL HEALTH PROFICIENCY STANDARDS SKILLS CHECKLIST**

**TITLE: BLOOD WITHDRAWAL FROM A TUNNELLED HEMODIALYSIS CVC**

| Name: ________________________ | Unit: ________________________ |
| Evaluator: ________________________ | Date: ____________________________ |

<table>
<thead>
<tr>
<th>Critical Behaviours Performed</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Masks (patient and nurse) and washes hands.</td>
<td></td>
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</tr>
<tr>
<td>2. Wipes normal saline injection port with 2% chlorhexidine gluconate/70% Isopropyl alcohol swab and uses separate swab to wipe locking solution injection port. Allows to air dry completely.</td>
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</tr>
</tbody>
</table>
| 4. Opens gauze around catheter lumens and places sterile 4x8 under lumens and exit site while removes old gauze. Places sterile 4x8 on top of lumens.  
4.1. Places prescribed antiseptic on 4x4. Scrubs surrounding skin and under lumens for a minimum of 30 seconds. Allows to dry completely.  
4.2. Removes gloves, washes hands. Removes 4x8s from catheter lumens.  
| 5. Scrubs exit site with 2% chlorhexidine gluconate/70% Isopropyl alcohol soaked gauze with friction to the skin and cleanses in a horizontal (side to side) plane extending 5cm from the catheter exit site, then cleanses in a vertical (up and down) plane, then, cleanses the skin beginning at the insertion site with a circular motion (middle to outward) extended in a 5cm diameter. Allows to dry completely (at least 2 minutes).  
5.1. Applies thin film of polysporin triple ointment to exit site. Places 2x2 gauze (opened and folded in half length wise) dressing under the wings followed by 2x2 gauze over catheter exit site.  
5.2. Applies additional gauze to cover the exit site followed by application of occlusive dressing to exit site. | | |
| 6. Aseptically, draws up normal saline and locking solution or obtains 4% sodium citrate pre-filled syringes.  
6.1. Ensures the lumen clamp is closed. Cleans CVC lumen TEGO connector with 2% chlorhexidine gluconate/70% Isopropyl alcohol swab(s). Allows to air dry completely. | | |
| 7. Attaches syringe by holding TEGO and rotating collar of syringe onto TEGO until it stops (do not over tighten).  
7.1. Opens the clamp and **withdraws 5 mL of discard blood.** Closes the lumen clamp. Disconnects syringe from TEGO by grasping TEGO and twisting syringe away from TEGO until loose.  
7.2. Cleans CVC lumen TEGO connector with 2% chlorhexidine gluconate/70% Isopropyl alcohol swab(s) for 15 seconds. Allows to dry.  
7.3. Attaches BD Vacutainer luer lok device. Opens lumen clamp, inserts tube into vacutainer device, fill tube(s) with appropriate amount of blood, | | |

*(Back to LM TOC)*
### Critical Behaviours Performed

<table>
<thead>
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<th>Behaviour</th>
<th>Yes</th>
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<tr>
<td>in Venipuncture Order of Draw. Inverts tube(s) as per Venipuncture Order of Draw. Disconnects BD vacutainer device. Closes lumen clamp. 7.4. Labels tube(s) and requisition and ensures correct patient matches labels.</td>
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<tr>
<td>8. Cleans CVC lumen TEGO connector with 2% chlorhexidine gluconate/70% Isopropyl alcohol swab(s). Allows to dry 8.1. Attaches normal saline syringe (as per step 7a), opens clamp, verifies blood return and flushes with 10 mL of saline. Disconnects syringe from TEGO (as per step 7b). Closes clamp.</td>
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<tr>
<td>9. Follows Maintaining Catheter Patency for CVC lumen locking procedure. Alteplase <strong>instillation is performed by RN only.</strong></td>
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<tr>
<td>10. Uses no touch technique throughout access procedure.</td>
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<tr>
<td>11. Wraps the catheter lumens with sterile gauze and applies additional gauze to the lumens followed by occlusive dressing. 11.1. Documents accordingly.</td>
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### CAPITAL HEALTH PROFICIENCY STANDARDS SKILLS CHECKLIST

**TITLE: NON-TUNNELLED HEMODIALYSIS CVC REMOVAL**

<table>
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<tr>
<th>Name: ________________________</th>
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#### Critical Behaviours Performed

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</tbody>
</table>

1. Checks physician’s order for removal.
   1.1. Masks (patient and nurse) and washes hands.

2. Sets up tray, aseptically.

3. Applies non-sterile gloves.

4. Opens gauze around catheter lumens and places sterile 4x8 under lumens and insertion site while removes old gauze. Places sterile 4x8 on top of lumens.
   4.1. Places prescribed antiseptic on 4x4. Scrubs surrounding skin and under lumens with back and forth motion for a minimum of 30 seconds. Allows to dry.
   4.2. Removes gloves, washes hands. Removes 4x8s from catheter lumens.
   4.4. Cleans the exit site as outlined in the procedure.

5. Cuts and removes the sutures from the CVC wings.

6. Places 2 x 2 sterile gauze over insertion site, instructs patient to perform hold their breath and bear down, slowly and steadily removes the catheter.

7. Exerts pressure over insertion (exit) site with 2 x 2 gauze until bleeding stops for a minimum of 20 minutes.

8. If no bleeding, has patient hold their breath and bear down., Removes 2x2 gauze & applies a 2x2 vaseline gauze or 2x2 gauze with betadine ointment followed by an occlusive dressing over top.

9. Instructs patient that if bleeding starts, to apply **direct pressure** and go to emergency department.

10. Instructs patient to leave pressure dressing in place for a minimum of 72 hours.

11. Documents accordingly.

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