

KINGSTON GENERAL HOSPITAL

NURSING POLICY AND PROCEDURE

SUBJECT	Central Lines Advanced Competency for Nurses: Adult (RNs and RPNs)	NUMBER	C-1801
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Introduction:

A central venous catheter is a catheter inserted centrally through the subclavian, internal jugular or femoral vein, or peripherally through the brachial, saphenous or cephalic vein (peripherally inserted central catheter - PICC). The distal end of the catheter is positioned in the superior or inferior vena cava regardless of the insertion site. (See Appendix A, Figures 1 and 2)

Central venous catheters that are tunneled or implanted i.e. Hickman or Port are considered to be long-term catheters. These catheters are usually tunneled in the subcutaneous tissue in the upper chest below the clavicle then eventually the distal end of the catheter is positioned in the internal jugular vein or axillary/subclavian vein.

Definitions:

Valved PICC: A valved PICC is a central venous catheter with a valve that is present at the distal or proximal tip. Valved PICCs require application of positive pressure (flushing or infusion) or negative pressure (aspiration) for fluid to move within the catheter. Clamping is not necessary; therefore, there are **no** clamps on a valved PICC. (See Appendix A, Figure 3)

Non-valved PICC: a non-valved PICC is a central venous catheter that does not have any valve and must be used in combination with a neutral or positive pressure cap, which will act as the valve. Non-valved PICCs will have clamps. (See Appendix A, Figure 4)

Tunnelled Catheter: a tunnelled catheter has a portion of the catheter tunnelled through the subcutaneous tissue prior to exiting from the skin (usually on the chest wall). There is a cuff on the catheter below the skin which encourages in-growth of fibrous tissue to provide a physical barrier to infection. These catheters are also known as Hickman catheters, Broviac catheters or Cook catheters. (See Appendix A, Figure 5)

Implanted Central Venous Device: an implanted central venous device (ICVAD) is placed under the skin; port is placed in chest or arm. The distal end of the catheter terminates at or near the superior vena cava. This device has a separate policy. (see Nursing Policy C-1830)

Positive Pressure Technique for a non-valved catheter: Exerting pressure on the syringe plunger while clamping and removing the syringe from the cap prevents reflux of blood into the catheter. When there is approximately 1.5 mL of saline solution left in the syringe, clamp catheter while simultaneously injecting a final 0.5 mL. The syringe should never be "bottomed out" or fully depressed. There should always be approximately 1 mL of fluid left in the syringe after this process.

Positive Pressure Technique for a valved catheter: Exerting pressure on the syringe plunger while removing the syringe from the cap prevents reflux of blood into the catheter. When there is approximately 1.5 mL of saline solution left in the syringe, simultaneously inject a final 0.5 mL of saline solution and remove syringe. The syringe should never be "bottomed out" or fully depressed. There should always be approximately 1 mL of fluid left in the syringe after this process.

Stop/start technique: Flush 2 - 3 mL at a time, pausing between each flush, to create a turbulent effect. This removes blood and or medications from the inside of the catheter and prevents catheter occlusion.

Policy:

1. Only authorized nurses (RNs and RPNs) may perform the following procedures related to central venous catheters (see Nursing Policies A-1250 and A-1257 for authorization requirements and competency to perform):
 - 1.1. initiation of an infusion
 - 1.2. discontinuation of an infusion
 - 1.3. obtaining a blood specimen
 - 1.4. changing the injection cap
 - 1.5. changing the dressing on a central line

NOTE: See Nursing Policy C-1820 regarding removal of central line.

NOTE: Nurses do not discontinue tunneled or implanted catheters.

2. An infusion via central venous catheter should be regulated by pump or buretrol.

NOTE: In emergent situations requiring rapid volume resuscitation, a buretrol or pump is not required.
3. Intravenous (IV) administration and extension sets must have luer lock connections.
4. A needleless system will be used when gaining access to the closed central line
5. A syringe smaller than 10 mL will not be used to gain access to a central venous catheter.
6. The IV tubing and the central venous catheter will be maintained as a closed system.
 - 6.1. All central lines must have a needleless end-cap.
 - 6.2. If it is necessary to place a stopcock in the line for administration of medication, a needleless injection cap will be placed on the stopcock to close the system.
7. If a PICC has been inserted, a tourniquet or blood pressure cuff will not be placed on the affected limb above the insertion site.
8. All central line solutions will be completed or discarded within 72 hours (see Nursing Policy T-7000 Tubing Changes).

EXCEPTION: Parenteral Nutrition (PN), i.e., amino acid and lipid solutions, will be completed or discarded within 24 hours.
9. Intravenous tubing will be changed (see Nursing Policy T-7000 Tubing Changes):
 - 9.1. a minimum of once every 72 hours
 - 9.2. Tubing changes may vary based on administration of certain fluids and medications.
Please refer to parenteral manual
10. The Authorized Health Care Professional (Physician or Advanced Practice Nurse) will confirm placement of central venous catheter before usage.
11. Patency should be established prior to administration of any fluid or medication. Patency can be established through one or all of the following:

- 11.1. Aspirate blood from catheter (for specific amount of withdrawal prior to blood sampling see Procedure D)
- 11.2. If unable to aspirate attempt a start/stop flush (never flush against resistance)
- 11.3. If unable to aspirate blood or flush catheter, clamp (if not a valved catheter) and remove cap, attach 10 mL syringe, unclamp and gently pull back until blood visible
- 11.4. If unable to aspirate or flush catheter, notify MD
12. To maintain patency flush with 20 mL of sterile 0.9% sodium chloride (clamping between syringe changes) using the start/stop technique prior to each medication administration, or blood product transfusion, even if continuous infusion present.
 - 12.1. In the case of a continuous infusion, flush at the port closest to the patient
 - 12.2. In the case of a multilumen catheter all lumens must be flushed when any lumen is accessed

NOTE: Flushes must be done manually with a syringe, not through an infusion pump as the pump does not provide enough pressure
13. When a central venous catheter remains in place for a prolonged period and is used intermittently:
 - 13.1. the line will be clamped when not in use
 - 13.2. the catheter will be flushed using start/stop technique following its use, a minimum of weekly with 20 mL sterile 0.9% sodium chloride, unless otherwise ordered; when the catheter has more than one lumen, all lumens must be flushed with 20 mL sterile 0.9% sodium chloride
 - 13.3. the valved central venous catheter is not clamped and is flushed weekly with 20 mL sterile 0.9% sodium chloride using a stop/start and positive pressure technique
14. Catheter cap(s) must be changed every 72 hours in the hospital setting for any central line, continuous or intermittent, or anytime the injection cap appears damaged, is leaking, is filled with blood or contaminated for any reason.
15. Central venous catheter insertion sites will be assessed a minimum of once per twelve hour shift for evidence of cannula related complications.
 - 15.1. If the patient has unexplained fever or there is pain or tenderness at the insertion site, the dressing will be removed and the insertion site will be examined.
 - 15.2. If redness, swelling, tenderness or discharge is noted at the site obtain a patient care order for a swab for culture and sensitivity.
16. The central venous catheter dressing will be changed:
 - 16.1. 24 hours post insertion of central line
 - 16.2. every 7 days for transparent dressings
 - 16.3. every 48 hours for gauze dressings (a transparent dressing with gauze under is considered a gauze dressing)
 - 16.4. when the dressing must be removed to allow inspection of the site
 - 16.5. when the dressing becomes damp, loosened or soiled
17. If a central venous catheter should break or develop a hole, the nurse will:
 - 17.1. immediately clamp the catheter as close to the skin insertion site as possible with existing catheter clamp or forceps
 - 17.2. position the patient in Trendelenburg position on left side
 - 17.3. notify the physician

18. When a central venous catheter is used to infuse Parenteral Nutrition (PN) solutions the single lumen catheter, or a specific lumen of a multilumen catheter, will be designated exclusively for PN solutions.
19. Only nurses authorized in the management of specialty catheters i.e. hemodialysis lines may manage the maintenance and care of such devices.

Procedure: The following is a list of appendicies regarding central line procedures:

Procedure A: Central line dressing

Procedure B: Initiation of Infusion

Procedure C: Discontinue Infusion

Procedure D: Obtaining a blood specimen

Procedure E: Changing an injection cap

Procedure F: Changing IV

Procedure G: Considerations with a tunneled catheter

PROCEDURE A: CENTRAL LINE DRESSING

Equipment

Dressing Tray

2% Chlorhexidine Gluconate with 70% alcohol solution/swab

Sterile Occlusive Dressing, either gauze and tape or a transparent dressing

Sterile Gloves

Mask

Procedure:

1. Perform hand hygiene
2. Mask, self and patient, if applicable i.e. in the case of immunocompromised patient
3. Assess catheter site and surrounding skin.
 - 3.1 If redness, swelling, tenderness or discharge present, inform the physician and request a patient care order for a swab for culture and sensitivity.
4. Cleanse catheter site with 2% Chlorhexidine Gluconate with 70% alcohol solution/swab using back- and- forth motion, clean at least a 4-6 inch area then allow skin to dry.
 - 4.1 Cover with sterile transparent dressing or gauze dressing as applicable and then label dressing with date, time, and initials of nurse performing procedure.

Recording and Reporting:

1. Notify the physician when:
 - 1.1 exit site redness, swelling, tenderness or discharge are noted
 - 1.2 the patient's oral or axilla temperature exceeds 38.5 degrees celsius
 - 1.3 dislodgement of the line is suspected
2. Document on the Interprofessional Comprehensive Patient Care Record, Interprofessional Progress Note or unit specific documents:
 - 2.1 completion of dressing change, site assessment and patient response
3. Note the next scheduled dressing change in the Interprofessional Patient Profile (kardex).

PROCEDURE B: INITIATION OF AN INFUSION IN AN ESTABLISHED LINE

Equipment:

Via Injection Cap

Alcohol swabs
Syringe 10 mL
Intravenous Tubing
Intravenous Solution (as ordered)
Sterile 0.9% sodium chloride (0.9% NaCl) vial or
pre-filled syringe 10 mL x 2
4x4 gauze

No Injection Cap (add cap)

Masks
Sterile Gloves
Multipurpose Dressing Tray (optional)
Alcohol swabs
Syringe 10 mL
Sterile 0.9% sodium chloride (0.9% NaCl) vial or
pre-filled syringe 10 mL x 2
Needleless end-cap
Intravenous Tubing
Intravenous Solution (as ordered)
4x4 gauze

NOTE:

- If catheter patency is not clearly established, do not flush/initiate infusion. Notify the physician.
- Never connect a syringe with a volume of less than 10 mL to a central venous catheter. The pressure would be too high when injecting or withdrawing and may damage the catheter.

Procedure:

1. Confirm patient care order.
2. Perform hand hygiene.
3. Apply mask to self and patient if patient is immunocompromised.
4. Assess catheter site and surrounding skin.
5. Perform hand hygiene and glove.

Initiation of Infusion in a Central Venous Catheter via Injection Needleless end-cap

1. Prime intravenous tubing with solution, as ordered.
2. Cleanse the port of the injection needleless end-cap by scrubbing thoroughly with alcohol swab. Place cleansed line and needleless end-cap on sterile gauze 4x4.
3. Attach 10 mL syringe.
4. Unclamp, and assess catheter patency (refer to number 11 of policy).
5. Clamp and remove syringe, and attach flush syringe.
6. Unclamp and flush with 20 mL sterile 0.9% sodium chloride (clamping between syringe changes) using start/stop technique.
7. Connect intravenous tubing, unclamp catheter and initiate infusion.

NOTE: no clamping is required for valved catheter.

PROCEDURE C: DISCONTINUATION OF AN INFUSION

Equipment:

Gloves
Sterile 0.9% sodium chloride vial
or pre-filled syringe 10 mL x 2
Alcohol swab
Sterile Gauze 4x4

Discontinuing an Infusion

1. Clamp catheter.
2. Disconnect IV tubing and attach sterile 10 mL syringe.
3. Unclamp catheter, verify patency and inject 20 mL sterile 0.9% sodium chloride (clamping between syringe changes) into the catheter using stop/start and positive pressure technique.
4. Clamp catheter.

NOTE: No clamping required for valved catheter.

Recording and Reporting:

1. Document discontinuation of intravenous solution and fluid volume infused on the Interprofessional Comprehensive Patient Care Record or unit specific document.
2. Document sodium chloride flushes on the Medication Administration Record.
3. Document complications in the Interprofessional Progress Notes.

PROCEDURE D: OBTAINING A BLOOD SAMPLE

Equipment:

Vacutainer	Alcohol swab
Vacutainer Adapter	Clean Gloves
Waste tube/syringe for waste	Waterproof Pad
Sterile Gauze 4x4	Blood Transfer Device
Sterile 0.9 % sodium chloride vial or pre-filled syringe 10 mL x 2	Specimen Bag
Masks	Blood Tubes (as required for specimen)

NOTE: With a multilumen central venous catheter all lumens must be flushed when ANY lumen is accessed.

NOTE: Coagulation studies (e.g., PT, PTT, INR) may be drawn from a central venous catheter ONLY when other access is not possible.

Blood Withdrawal from a Central Line

****For information pertaining to blood cultures please see blood culture collection tool on intranet under clinical tool tab****

1. Confirm the patient care order.
2. Prepare flush syringes (2 x 10 mL sterile 0.9% sodium chloride).
3. Prepare a sterile 10 mL syringe and/or waste tube with vacutainer and adapter.
4. Perform hand hygiene.
5. Mask, self and patient, if applicable i.e. in the case of immunocompromised patient.
6. Cleanse the port of the injection needleless end-cap by scrubbing thoroughly with alcohol swab (let dry for 1 minute). Place cleansed line and needleless end-cap on sterile gauze 4x4.
7. If drawing blood from a line where an infusion is running in the other lumen, stop the infusion for at least 30 seconds prior to blood sampling, and flush with 20 mL of 0.9 sodium chloride prior to sampling.
8. Clamp line. Insert syringe.
9. Unclamp, establish patency, and then flush with 20 mL of 0.9% sodium chloride (clamping between syringe changes) using stop/start technique. Clamp and remove syringe.
10. Insert syringe or vacutainer set up into catheter cap port. Unclamp.
11. If using syringe system, pull back on the syringe plunger to obtain recommended volume of blood (6 mL). Clamp and discard waste.
 - 11.1 Insert new syringe and unclamp, draw off blood required and transfer into the appropriate tubes using a blood transfer device to maintain the order of draw.
12. If using a Vacutainer system, insert device, withdraw into a waste tube, clamp and discard waste.
 - 12.1 Continue drawing off according to the order of draw.
 - 12.2 Clamp between blood tube changes and after all samples obtained.
13. Attach 10 mL syringe of sterile 0.9 % sodium chloride, unclamp and flush with 20 mL of sterile 0.9% sodium chloride solution (clamping between syringe changes) using stop/start and positive pressure technique.

NOTE: No clamping required for valved catheter

Reporting and Recording:

1. Document sterile 0.9% sodium chloride flushes on the Medication Administration Record.
2. Document nursing observations and actions in the Interprofessional Comprehensive Patient Care Record, Interprofessional Progress Note or unit specific documents.

PROCEDURE E: CHANGING AN INJECTION CAP

Equipment:

Masks x 2	Multipurpose Dressing Tray (optional)
Gloves	Alcohol Swab
Needleless end-cap(s)	Sterile Gauze 4x4
Sterile 0.9 % sodium chloride vial or pre-filled syringe 10 mL x 2	

NOTE: Catheter needleless end-cap(s) must be changed every 3 days on intermittent or continuously used catheters and/or replaced sooner when there are signs of needleless end-cap damage or blood in the needleless end-cap, e.g., crack, leak or contamination.

Procedure:

1. Perform hand hygiene.
2. Apply mask to self and patient if patient is immunocompromised.
3. May prepare multipurpose dressing tray (optional).
4. Using aseptic technique prefill injection needleless end-cap with 0.9 % sodium chloride.

Changing the Injection Needleless End-cap

1. Prepare a 10 mL syringe with sterile 0.9 % sodium chloride.
2. Drop prefilled sterile needleless end-cap onto sterile gauze or onto dressing tray.
3. Scrub the connection and the contiguous tubing as applicable with alcohol (let dry 1 minute). Place cleansed line and needleless end-cap on sterile 4x4 gauze.
4. Clamp catheter and remove old injection needleless end-cap.
5. Attach prefilled sterile needleless end-cap.
6. Unclamp and assess patency.
7. Clamp and connect the syringe to the catheter. Inject a total of 20 mL sterile 0.9 % sodium chloride (clamping between syringe changes) and flush using the stop/start and positive pressure technique.

NOTE: No clamping required for a valved catheter.

Recording and Reporting:

1. Document needleless end-cap change on the Interprofessional Comprehensive Patient Care Record, interprofessional progress notes or unit specific flow sheet.
2. Document next needleless end-cap change on the Interprofessional Patient Profile.

PROCEDURE F: CHANGING IV TUBING

Equipment:

Masks x 2	Sterile Gauze 4x4
Gloves	Syringe 10 mL
Dressing Tray	Sterile 0.9 % sodium chloride vial or pre-filled syringe 10 mL x 2
Alcohol swabs	Intravenous Tubing (as required)
Intravenous Solution (as ordered)	

NOTE: If IV tubing being changed, any added devices should also be changed such as needleless end-caps or extension lines.

Procedure:

1. Apply mask to self and patient, if patient is immunocompromised.
2. Assess catheter site and surrounding skin.
3. Scrub catheter and intravenous tubing junction for a minimum of 30 seconds with alcohol (let dry for 1 minute).
4. Prime intravenous tubing with prescribed solution.
5. Perform hand hygiene.
6. Clamp catheter.
7. Remove the old intravenous tubing and insert the new intravenous tubing. Ensure luer lock is secured tightly.
8. Unclamp catheter and initiate intravenous infusion.

Reporting and Recording:

1. Document needleless end-cap change on the Interprofessional Comprehensive Patient Care Record, interprofessional progress notes or unit specific flow sheet.
2. Document next needleless end-cap change on the Interprofessional Patient Profile.

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PROCEDURE G: CONSIDERATIONS WITH A TUNNELLED CATHETER

1. A tunnelled catheter with neutral or positive pressure end cap is treated the same as any other central line. See procedures above, and for additional management see below.
2. **Dressing:** Refer to Procedure A above. Once the entry site is healed no dressing is required (typically 21 days post insertion). This type of catheter is very heavy and should be securely anchored to the chest wall

NOTE: Pinch off syndrome: Pinch off syndrome occurs when the catheter is “pinched” or compressed between two bony structures. This pinching will lead to an inability to infuse or withdraw from the catheter. Repeated wear and tear on the pinched portion of the catheter can lead to catheter fracture or embolus. Physician should be consulted if there is suspicion of pinch off syndrome.

NOTE: If flushing is possible but aspiration is not the physician should be consulted prior to infusing fluids.

Related Policies

- A-1250 Clinical Nursing Procedures: Designation, Authorization and Education, and Competency to Perform (Policy)
- A-1257 Clinical Nursing Procedures: Advanced Competency Procedures Approved for Nurses (RNs and RPNs), Authorization/Challenge/Re-authorization Requirements, and Basic Procedures for Which Additional Education is Required (Policy)
- C-1820 Removal of Central Line
- C-1830 Implanted Central Venous Access Device
- T- 7000 Tubing Changes

References:

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Director, Professional Practice – Nursing Signature

Date

Appendix A
Additional Photographs for identification of Lines

Anatomical Location of Short and Long Term Central Venous Catheters

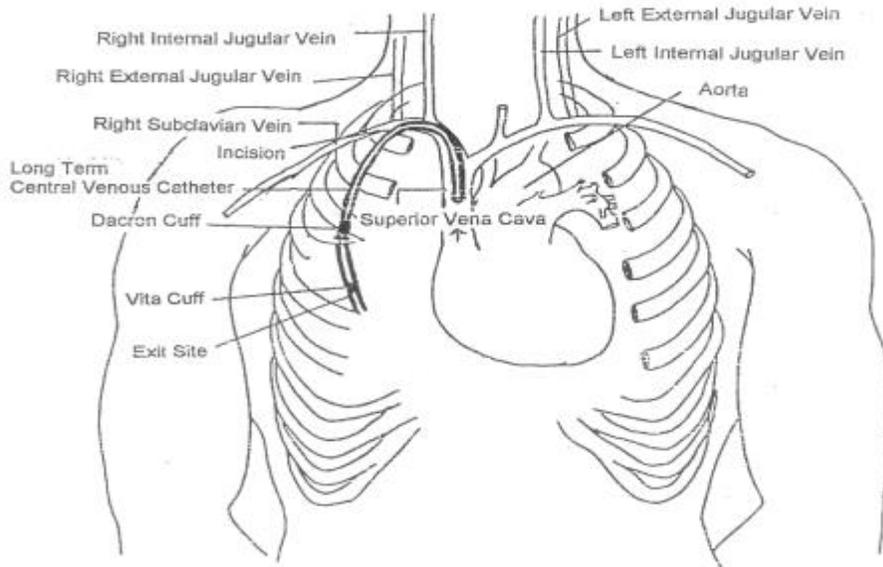


Figure 1

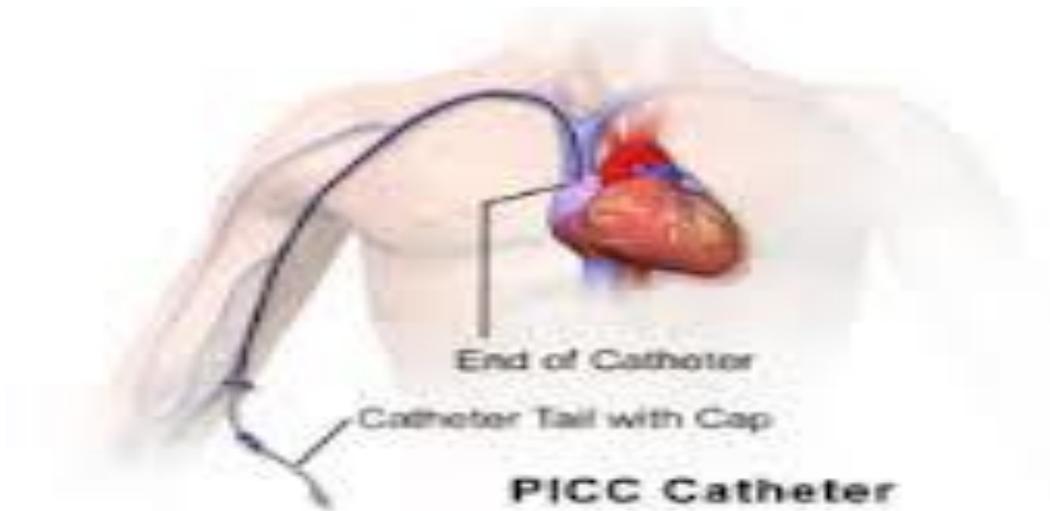


Figure 2

Valved PICC *note no clamp



Figure 3

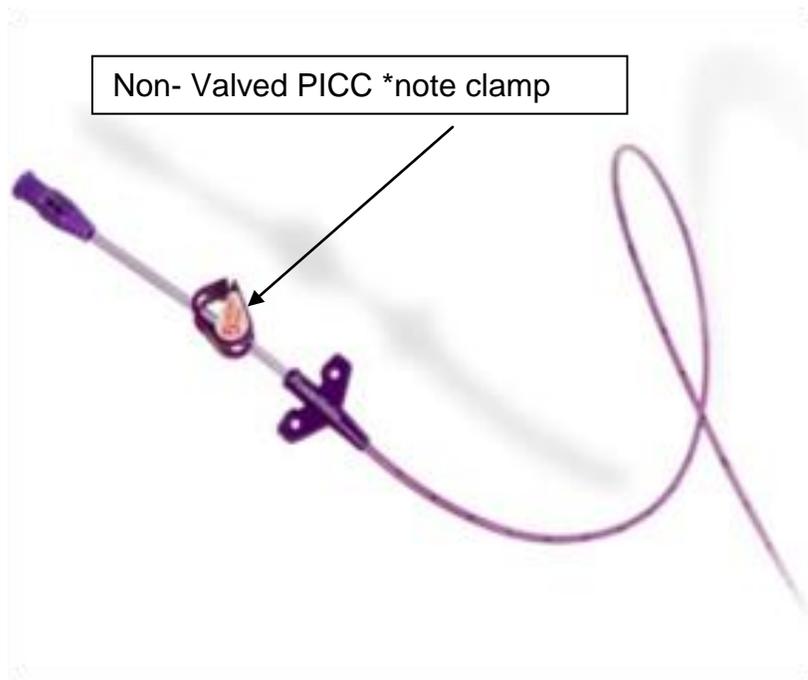


Figure 4

http://www.uwhealth.org/images/ewebeditpro/uploadimages/4558_Figure_1.jpg

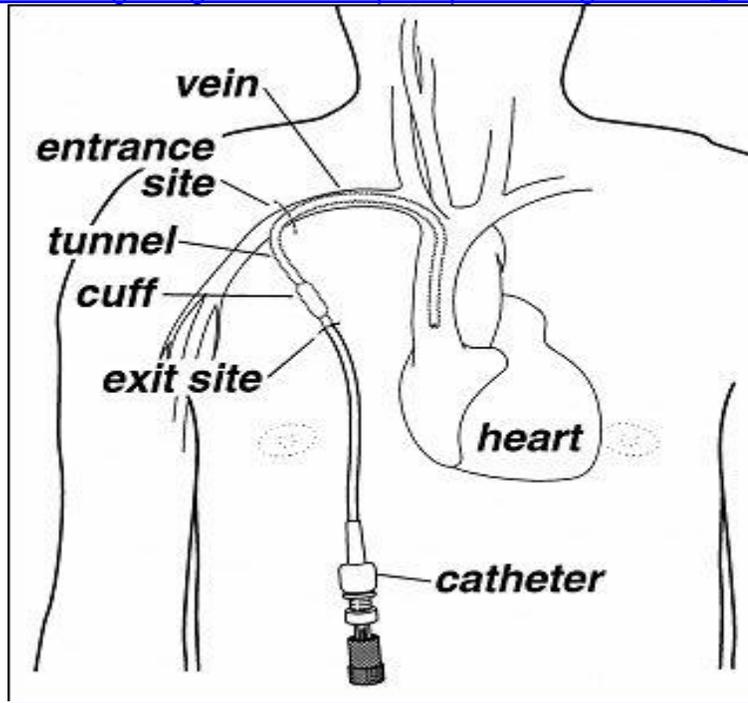


Figure 5