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Resource Manual

Implanted Ports and Tunnelled Catheters



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INTRODUCTION

This learning package is a resource, designed to standardize education for all nurses caring for patients with central lines. It is important that the reader know Quinte Healthcare Corporation (QHC) policies on Central Venous Access Devices (CVAD's) and have successfully been certified on the care and maintenance of central lines before managing central lines independently.

This package is intended to be a part of orientation to CVAD care and maintenance. If at the completion of this program you feel that you are unable to perform these skills, it is your responsibility to confer with your Clinical Educator, Nurse Manager, or Charge Nurse/delegate.

Practice Guidelines

Nurses will attend in-service training as provided by QHC, which includes theory, anatomy & physiology, demonstration and practice of all CVAD applications currently used in QHC.

Nurses will complete a test and achieve a minimum of 80%.

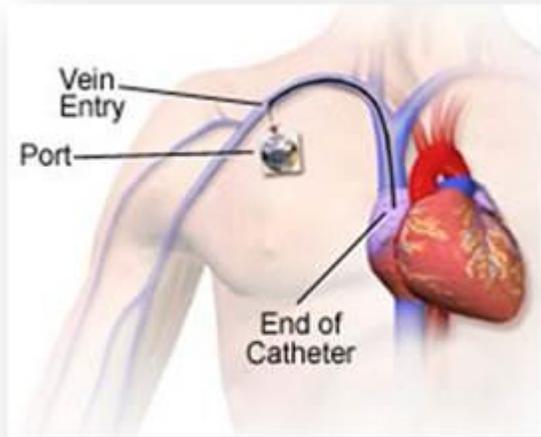
Nurses will be supervised at least two times for each skill by a nurse competent in central line care and maintenance. Evaluating nurses will document on the appropriate "Skills Checklist" including date and signature. Comments should include whether or not the candidate is safe to practice independently.

Completed checklist should be photocopied, with one copy given to the staff member and original to Unit Manager.

Continuing Competence

It is strongly recommended that certified nurse's review all skills related to the care and maintenance of central lines on an ongoing basis to ensure continued competence. If at any time the nurse feels additional review/retraining is required, it is the responsibility of that nurse to seek additional education/resources from the manager, or clinical educator/delegate to ensure continued competence related to CVAD care and maintenance. Nurses are professionally responsible for ensuring that they have the requisite knowledge, skill and judgment necessary to provide safe and effective infusion therapy (CNO, 2002).

IMPLANTED PORTS



Implanted ports consist of a catheter attached to a port with a septum. The port is placed in the subcutaneous tissue and the attached catheter is inserted into the chosen central vein with all aspects of the port implanted and located completely beneath the skin. These CVAD's consist of a reservoir, catheter, and central septum and can be single or double lumen (if double each port is accessed separately) and may be valved or non-valved. The self-sealing septum can generally withstand up to 2000 needle

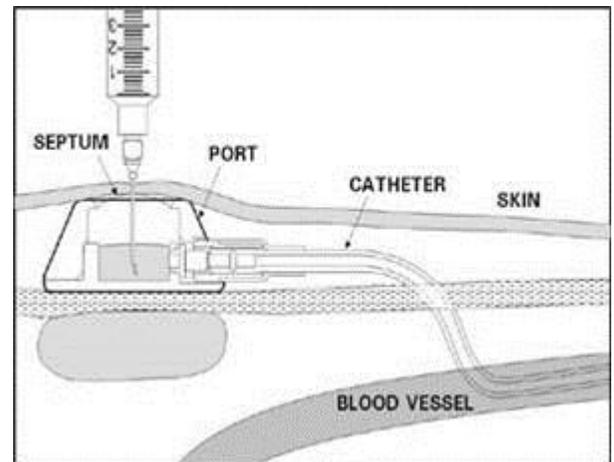
punctures (dependent upon manufacturer and needle gauge used). Implanted ports are inserted for long-term therapies.

Location

Ports are placed under the skin then the catheter is typically inserted in one of the following veins:

Internal Jugular Vein: The internal jugular vein initially descends behind and then to the outer side of the internal and common carotid arteries. It then joins the subclavian vein at the base of the neck. At this point the left subclavian vein receives the thoracic duct, whereas the right subclavian vein receives the right lymphatic duct.

Subclavian Vein: The subclavian vein is a continuation of the axillary vein and extends from the outer edge of the first rib to the inner end of the clavicle. Here it enters the inner jugular vein to form the innominate vein.



Types

There are varying types of port reservoirs depending on the make and model:

- Single lumen port
- Double lumen port
- Valved and non-valved
- High or low profile
- PowerPorts

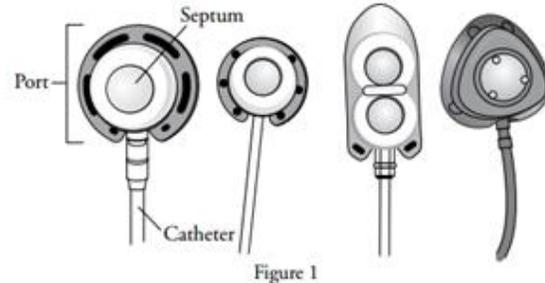


Figure 1

INDICATIONS

Ports are a great option for patients who require long term access for the following:

- Chemotherapy
- Antibiotics
- Pain management
- Fluids
- Parenteral nutrition
- Frequent transfusions of blood or blood products

Relative Contraindications for Insertion

- Clotting disorder
- Neutropenia
- Thrombocytopenia
- Active infection

Benefits and Risks

Advantages	Disadvantages
<ul style="list-style-type: none"> ♦ Long term use - can be years ♦ Site care only if port is accessed ♦ Less flushing required ♦ No dressing ♦ No external segment for breakage ♦ Greater personal freedom for patient and better body image ♦ Decreased risk of infection 	<ul style="list-style-type: none"> ♦ Non-coring needle required to access ♦ Needle dislodgement can result in infiltration ♦ Most expensive vascular access device ♦ Surgical placement and removal ♦ Catheter fracture or migration ♦ Risk of infection

Insertion of Subcutaneously Implanted Port

- A surgical incision is made in the upper to middle chest, usually near the collarbone, to form a pocket to house the port. Adequate subcutaneous tissue is required over the proposed port site to prevent erosion through the skin.
- The catheter is inserted via cut down into the selected vein
- The port is then placed in the subcutaneous fascia pocket. The port contains a reservoir that leads to the catheter.
- The tip position is confirmed by fluoroscopy, adjusted if needed, then sutured.
- The incision for the port pocket is sutured closed, and a sterile dressing is applied
- Once the incision has healed a dressing is not required

CARE AND USE OF IMPLANTED PORTS

Assessing Implanted Port Integrity

- Shortness of breath, chest pain and cardiac arrhythmias may indicate CVAD migration, shearing, fragmentation and embolization; notify physician and do not use.
- Edema, erythema, swelling or tenderness may indicate infection or catheter leakage; notify physician and do not use.
- When flushing, observe the catheter tract for infiltration and/or swelling, and question or observe the patient to determine whether burning, pain, or discomfort is experienced. If this is the case, notify physician and do not use.
- Difficulty in aspirating blood and or injecting/infusing may indicate catheter compression, malposition, and/or obstruction. Always check to ensure the needle is fully inserted into the port and not sitting embedded in the septum
- Blood return is necessary to confirm catheter and port attachment.
- Do not rock or twist gripper needle during insertion or flushing as this will damage the silicone septum.
- Implanted Ports that are not actively used need to be flushed with Saline and Heparinized once a month.

Management of Implanted Ports

Pain:

- During the first week most patients will experience some pain and tenderness at the insertion site.

Wound Care:

- Keep dressings clean & dry while the incision heals
- No showers until sutures have been removed; may have tub or sponge baths
- Dressings can be removed after 1 week if healed

Sutures are usually removed in 10 to 14 days – however there are patient variables which can delay the healing process and underscore the importance of site inspection

Activity:

- No heavy lifting or strenuous exercise for 2 weeks – no other restrictions

Accessing Implanted Ports

Access to the implanted port is with specially designed needles only, which are deflected at the tip to prevent coring of the septum. This type of needle allows the septum to reseal when the needle is withdrawn.

This procedure may be painful to some patients. Emla® Cream is often applied (and the area covered with an occlusive dressing), at least one hour in advance of the procedure. Emla® Cream is a Lidocaine-Prilocaine based topical analgesic and requires a physician order.

Procedure

1. Explain the procedure to the patient.
2. Don mask (as appropriate), wash hands, & position patient. Patient should be upright or semi recumbent with a firm surface behind their back. Ensure that breasts are allowed to fall naturally (no bra).
3. Expose port area. Observe/note any abnormal findings (e.g.: bruising or signs of infection).
4. Landmark the Port:
 - a. with non-dominant hand, stabilize the port between the thumb and the first two fingers forming a C around the port.
 - b. with dominant hand, palpate the skin gently over the port to identify its contours and establish anatomical landmarks, note direction of port catheter.

5. Set up and prepare dressing tray, adding appropriate size of gripper needle, sterile syringe, positive displacement cap, chlorhexidine and 10mL sterile normal saline.
6. Don sterile gloves.
7. Attach positive displacement cap to tubing of gripper needle. Purge and tighten tubing including Y port with syringe containing 2-3 mL of normal saline. Leave syringe attached.
8. Cleanse skin over port area with Chlorhexidine soaked 2x2 gauze:
 - a. Use an up and down scrubbing motion and cleanse an area of 10 to 13 cm or larger than dressing size. Repeat twice more.
 - b. Allow to air dry. Do not fan area or try to speed up this process. Air dry will take approximately 60 seconds, and enhances the maximum antimicrobial effect from the product.
9. With non-dominant hand, stabilize port by placing thumb and first two fingers forming a 'C' around the port. Cover catheter with thumb.
10. With dominant hand, firmly grasp gripper needle by finger tabs between thumb and forefinger. Hold gripper needle at 90° angle just above the skin level. Do not rest the needle on the skin.
11. Carefully, but firmly, insert the needle in one continuous motion through the skin and septum until you meet resistance.
12. Pull back on syringe and gently aspirate 5 mL blood. Remove syringe.
13. If blood return is not apparent:
 - a. assess syringe
 - b. assess catheter for kinking
 - c. have patient inhale or cough
 - d. have patient raise arms above head
 - e. have patient change positions
14. Do Not Force. Try pull/release technique to clear any blockage. If there is no blood return or if the priming solution cannot be injected, the level of the needle may be occluded by the port septum. Try to advance the needle further into the port to the needle stop. If you cannot advance, remove the gripper and access with another sterile gripper.

15. Notify physician if patency is not clearly established and stop the procedure.
16. If blood specimen is required do so now and refer to procedure for blood sampling.
17. Attach a pre-filled 10 mL normal saline syringe.
18. Flush port using turbulent flush technique. Observe the area of skin around the port, up the subcutaneous tunnel and entry site for any sign of swelling. Remove the syringe. Repeat with second 10 mL NS filled syringe.
19. If the gripper is being left in place, remove finger tabs from gripper needle by squeezing them together and gently peeling them off needle.
20. Apply semi permeable transparent dressing; avoid tenting the dressing by adhering to the gripper and around the gripper while moving outward.
21. Document

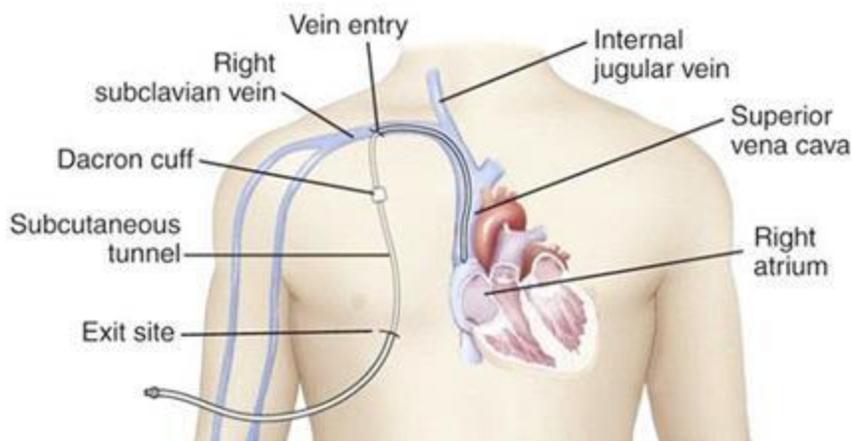
Heparinizing an Implanted Port

Procedure

1. Cleanse positive displacement cap with alcohol wipe 3 times and allow to dry
2. Attach syringe with 2-3 mL of NS and establish patency
3. If brisk blood return is evident flush with two 10mL syringes of NS using turbulent flush method
4. Attach syringe with heparin 100u/mL
5. Determine a countdown pattern while another nurse or the patient secures the port
6. Pull gripper free of the port while continuing to instill heparinized solution
7. Apply small dressing & document per protocol
8. Instruct the client/patient to remove dressing in 24 hours

If you are not able to obtain blood return and/or easily flush the lumen, further assess the line for signs of mechanical obstruction. Employ techniques to straighten the catheter within the vein (e.g. have the patient change position, turn their head away from the catheter, raise arm above their head). If this is unsuccessful, inform physician.

NOTE: Patency MUST be established prior to locking an implanted port



Tunneled central lines use a percutaneous approach but a segment of the catheter is tunneled in the subcutaneous tissue from the vein entrance to the exit site with long-term securement achieved with a cuff. This antimicrobial

dacron or collagen cuff is located along the catheter sheath about 5cm from the catheter exit site. This cuff potentially minimizes risk of ascending infection from migration along the outside of the catheter, as well as assisting in stabilizing the catheter through fibrous tissue enmeshing into the cuff. Due to this cuff the sutures can be removed after one month and at that time a dressing is no longer required.

Location

The catheter tip is placed via one of the large central veins, most often the subclavian or jugular.

Types

Tunneled catheters may be valved, non-valved, are available with single, double, or triple lumens, and vary in size from pediatric (Broviac) to adult (Cook) with most internal lumens ranging from 0.5 to 1.6mm. This type of CVAD is indicated for the community setting and long-term therapies.

Valved Tunneled Catheters

It is not necessary to clamp the tunneled valved catheter because the valves seal fluid within, and prevent air from entering the lumen

If blood or fluid is aspirated from the catheter, flushing the lumen is required to cleanse the lumen and allow the valve to return to the neutral position.

Straining or heavy lifting can cause a small amount of blood to back up into the catheter. If there is the potential for reflux check catheter patency and flush

Insertion of Tunnelled Catheter

- Surgical insertion, with the patient under local or general anesthesia, by cut down of a centrally located superficial vein – usually the external jugular, subclavian vein or (less commonly) the cephalic vein.
- The external end of the catheter is tunnelled through the subcutaneous tissue 5 to 8 cm, exiting through a small incision in the skin.
- The position of the tip is confirmed by fluoroscopy, adjusted if needed, and sutured to the skin, or closed with steri tape strips.
- Sutures remain in place for a minimum of 21 days.
- Initially there are two incisions requiring care; the insertion site (proximal site), and the exit site (distal site), where the catheter leaves the body.
- After the incisions are well healed, restrictions to the patient are few, but swimming is prohibited.
- Removal of these catheters is a surgical procedure.

Assessing Tunnelled CVAD Integrity

- Shortness of breath, chest pain and cardiac arrhythmias may indicate CVAD migration, shearing, fragmentation and embolization; notify physician and do not use.
- Edema, erythema, swelling or tenderness may indicate infection or catheter leakage; notify physician and do not use.
- When flushing pay particular attention to the venous insertion site and observe the catheter tract for infiltration and/or swelling, and question or observe the patient to determine whether burning, pain, or discomfort is experienced. If this is the case, notify physician and do not use.
- Difficulty in aspirating blood and or injecting/infusing may indicate catheter compression, malposition, and/or obstruction.
- Lay the patient supine to ensure chest symmetry. Palpate the catheter tract. The tract should not be palpable (exception is the jugular site which is palpable and visible) beyond insertion site and Dacron cuff.

POTENTIAL CVAD COMPLICATIONS

Complication	Signs & Symptoms	Prevention	Intervention
Occluded Catheter/Port	Unable to flush Unable to aspirate blood return Slow/sluggish blood return or infusions.	Flush promptly after all intermittent infusions, blood draws Maintain positive pressure in line when not in use Assure all flush solutions & drugs are compatible	Assess cause If blood clot: certified nurses can instill a thrombolytic with a physician order If chemical occlusion: inform physician to consider line removal
Septicemia, central line infection	Chills Fever Headache Malaise Glucose intolerance Backache Nausea & vomiting Vascular collapse Shock Death	Use aseptic technique & maintain an adherent dressing Use intact equipment and never use equipment/solutions with expired dates Follow tubing change, solutions policy(s) Monitor vital signs include temperature	Stop infusion & notify physician if Temp greater than 38°C Administer therapeutic interventions as ordered
Broken Catheter	Leakage of fluid, blood from catheter or dressing	Keep sharps away from catheter Check position of clamps before flushing Do not use syringes smaller than 10mL	Clamp catheter with toothless clamp below break towards chest wall Repair or replace
Embolism Clot, catheter segment, or air becomes free-floating in blood & propelled into Pulmonary Artery	(PE/Catheter): sudden chest pain, tachycardia, dyspnea, productive cough and reddish-pink sputum. Mimic symptoms of MI. (Air): chest pain, pallor, cough, cyanosis, syncope, mill-wheel murmur, shock, coma and death	Do not forcibly flush against resistance to clear catheter occlusion Prevent IV from running dry Use only luer lock equipment, remove all air from tubing prior to starting infusion Do not use scissors to remove tape from catheters Do not remove cap without 2 appropriate clamps applied to catheter	PE/Catheter: Administer O2 per orders Notify physician immediately Administer Meds as ordered Air Emboli: Close off source of air, if possible (i.e., empty glass bottle) Place patient on Left side in Trendelenburg Notify physician immediately Administer ordered meds
Circulatory Overload	Presents as CHF. jugular vein distention, peripheral edema, dyspnea, agitation,	I&Os use pumps for infusions, especially if client history of CHF, renal failure	Stop infusion High fowler's position, Monitor Vital signs Administer O2

	tachypnea, cough, crackles heard in lung bases	Do not attempt to catch up if IV fluids behind schedule and notify physician of noted signs / symptoms	Notify physician immediately Administer treatment as ordered
Speed Shock	Systemic toxic reaction when a substance foreign to the body is rapidly introduced i.e.: IV push medication or runaway IV Signs and symptoms: flushing, headache, syncope, shock, cardiac arrest	Administer drugs and fluids at rate prescribed Keep flow control devices out of reach if disoriented /confused /paediatric patients Monitor flow rate at least hourly, use infusion pump for delivery of all continuous infusions of medications	Slow IV; Maintain access Notify physician immediately Perform emergency care PRN to maintain ABCs Administer treatment ordered by physician
Catheter Migration	Proximally: tip advances into the heart. Atrial or ventricular arrhythmias, short of breath, palpitations, cardiac tamponade if infusion into myocardium. Distally: tip withdraws out of distal SVC. Patient hears swishing / gurgling in same side ear when flushing (tip in jugular vein), early signs of occlusion, Signs and symptoms of infiltration / extravasation	Careful securement of at time of insertion, post confirmation X-ray Measure & document external catheter length (if applicable) Do not use if migration is suspected until tip location confirmed by x-ray	Confirm tip location radiographically at time of insertion, and at any other time migration is suspected Do not use until tip location is confirmed. Proximally migrated – tip may be withdrawn Distally migrated – must remove & replace; cannot by advance
Anaphylaxis	dyspnea, wheezing, choking, cyanosis, coughing, SOB, difficulty swallowing, tightness or chest pain, edema of hands / feet/ face / neck & eyelids, urticaria, hoarseness, generalized erythema, feeling of warmth, pruritis, nausea, vomiting, abdominal cramps, diarrhea, incontinence, rapidly	Awareness of cross-sensitivities (ex. PCN / cephalosporin's) between meds Know hospital anaphylaxis policy and frequently review protocols for administering emergency medications. Know orders (Pre-Printed or Medical Directives) on all patients receiving infusions of IV medications to initiate anaphylaxis protocol PRN	Stop meds infusing, (Maintain IV access) Call Code Blue if necessary Maintain Airway Administer emergency medications per Anaphylaxis Medical Directives or direct physician order Administer Oxygen Monitor vital signs continuously Stay with patient

	falling BP, chills, diaphoresis, weakness, thready pulse, dizziness, flushing & pallor, drowsiness, agitation, anxiety, shaking, throbbing in the ears, paresthesia, coma, death		Document sequence of events and care provided Note new allergy in patient health record
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QUICK REFERENCE GUIDE

CVAD Line Care	Management
Assessments and care for tunnelled catheters	<ul style="list-style-type: none"> ✓ Assess insertion site: Inspect the site for bleeding, exudate, leakage, redness and swelling ✓ Assess catheter tubing: assess for migration, malposition, kinks, and cracks ✓ Review for need and potential for removal of the CVAD ✓ Change cap and dressing every 7 days ✓ Flush Lumens every 7 days
Assessments and care for Implanted Ports	<ul style="list-style-type: none"> ✓ Assess site: Inspect the site for redness, warmth and swelling ✓ Assess patient: for signs of fever, infection ✓ Review for need and potential for removal of the CVAD ✓ Flush Lumen(s) every month
Syringe size	✓ 10 mL or larger
Flushing	<ul style="list-style-type: none"> ✓ Flush all lumens with 20 mL saline after all meds, infusions, and when discontinuing IV ✓ Always use start-stop technique to create a turbulent flush ✓ Flush with <i>minimum</i> 20 mL saline after blood draws & TPN ✓ Always use a positive-pressure flush → disconnecting syringe while injecting last 0.5 mL of saline
Drawing blood	<ul style="list-style-type: none"> ✓ If IV infusing stop infusion prior to blood work for at least 1 minute ✓ Pre-flush with 2-3 mL of saline ✓ Aspirate gently. Let the blood come to you. ✓ Take adequate discard with same syringe – 5 mL is adequate. ✓ Flush all lumens after blood draw ✓ Do NOT leave blood in lumen while transferring blood or getting more equipment – flush first

PORT AND TUNNELLED CATHETER QUIZ

Read the following and circle the answer you feel best answers the question or best completes the sentence.

1. The tip of a CVAD device inserted via the chest wall or upper limb should ideally be placed in the:
 - a. lower one third of the superior vena cava
 - b. lower one third of the inferior vena cava
 - c. lower one third of the basilic vein
 - d. anywhere in the subclavian vein
2. When accessing a CVAD, always use at least a _____ - sized syringe.
 - a. 5mL
 - b. 3mL
 - c. 10mL
 - d. 20mL
3. How long should you wait after stopping a continuous infusion, before drawing a blood sample?
 - a. 2 minutes
 - b. 1 minute
 - c. 5 minutes
 - d. 15 seconds
4. Sutures on a Tunnelled CVAD device must remain in place for 3 full weeks after insertion.
 - a. True
 - b. False
5. The concentration of heparin most commonly ordered for an adult client/patient is:
 - a. 10u/mL
 - b. 100u/mL
 - c. 1000u/mL
 - d. none of the above

6. When not in use, an Implanted Port must be flushed every:
 - a. month
 - b. 8 weeks
 - c. 7 days
 - d. 2 weeks

7. A turbulent, pulsating flush method is used when flushing a CVAD because it:
 - a. reduces the PPSI pressure on the catheter
 - b. reduces the risk of pneumothorax
 - c. eliminates the need for a heparin flush
 - d. helps to dislodge fibrin and medication residue from the internal lumen

8. A Tunnelled catheter not in active use should be flushed:
 - a. daily
 - b. q 7 days
 - c. q 28 days
 - d. q 3 days

9. Implanted ports have a number of advantages including:
 - lower risk of CVAD-related infection
 - ability to withstand repeated access
 - enhanced body image
 - easily removed by trained nurses upon completion of therapy course
 - a. 1 and 4
 - b. 1, 2 and 3
 - c. 2, 3 and 4
 - d. all of the above

10. Swelling and burning are evident around an implanted port during infusion or flushing. This is an indication of:
 - a. infiltration
 - b. cardiac tamponade
 - c. pulmonary embolus
 - d. none of the above