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Resource Manual

Peripherally Inserted Central Catheters (PICCs) Percutaneous Central Catheters



***“Together...supporting quality care”
Revised September 2016***

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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.

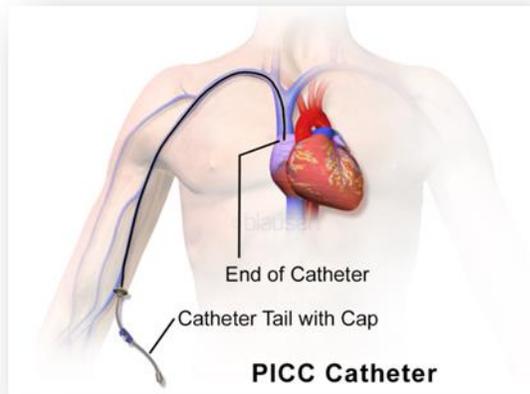
Practice Guidelines

1. 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.
2. Nurses will complete a test and achieve a minimum of 80%.
3. 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.
4. 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).

PERIPHERALLY INSERTED CENTRAL CATHETER (PICC)



A Peripherally Inserted Central Catheter (PICC) is a small gauge catheter that is inserted peripherally but the tip sits in the central venous circulation in the lower 1/3 of the superior vena cava. It is suitable for long term use and there are no restrictions for age, or gender.

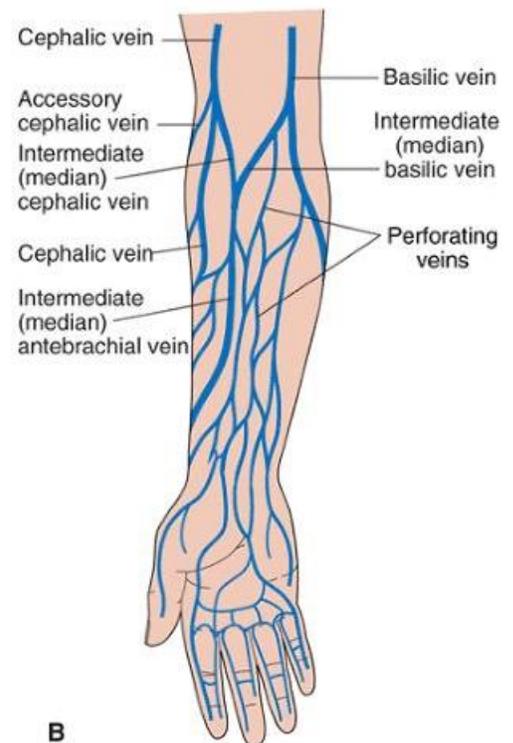
Location

PICCs are commonly placed at or above the antecubital space in the following veins:

Cephalic vein: The cephalic vein ascends along the outer edge of the biceps muscle to the upper aspect of the arm. It terminates in the axillary vein just below the clavicle.

Basilic vein: The basilic is larger than the cephalic vein. It passes up the arm in a straight path along the inner side of the biceps muscle. The basilic vein terminates in the axillary vein

Medial-cubital vein: The medial cubital vein runs along the anterior surface of the arm and is often visible in the antecubital area. It creates interface between the cephalic and basilic veins and often forms a 'Y' with one branch going to the basilic vein (called the median cubital basilic) and the branch going to the cephalic vein (called the median cubital cephalic).



Types

PICCs can vary in size, number or lumens, valves and brands. Be sure you are familiar with the type of PICC your patient has in-situ.

Lumens

1. PICCs may be single or multiple lumen, having 1, 2 or 3 access lumens. With multi-lumen catheters each separate lumen is enclosed within a single sheath making the catheter appear to have only one line.
2. Each lumen/line will allow for separate infusions through an individual lumen.



Single-Lumen



Double-Lumen



Triple-Lumen



Valved and non valved

Catheters are either non-valved (open-ended) or valved.

- The valve is a pressure-sensitive slit that remains closed unless fluids are infused (positive pressure: valve opens outward) or blood is withdrawn (negative pressure: valve opens inward). When not in use the closed valve seals fluid inside the catheter preventing blood from entering the catheter. This helps reduce the potential for retrograde blood flow with possible catheter occlusion and reduced risk for air embolism.
- Catheters without valves will always require a clamp to prevent blood reflux or air entry into the lumen(s). Catheters with valves will not require a clamp.

Indications

PICC lines are suitable for many situations when access is limited or expected to last longer than 2 weeks and also allows for easy blood draws where appropriate.

Indications Include:

- ♦ Compromised/Inadequate peripheral access
- ♦ Infusion of hyperosmolar solutions or solutions with high acidity or alkalinity (e.g. Total Parenteral Nutrition)
- ♦ Infusion of vesicant or irritant agents (Inotropes, Chemotherapy)
- ♦ Short or long term intravenous therapy (e.g. Antibiotics)

Contraindications for PICC Insertion

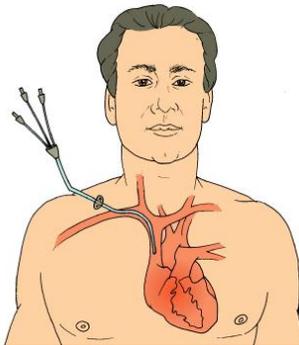
- ◆ Previous upper extremity venous thrombosis (DVT)
- ◆ Trauma or vascular surgeries at or near the site of insertion
- ◆ Presence of a device related infection, cellulitis, or bacteremia at or near the insertion site
- ◆ Lymphedema.
- ◆ Mastectomy surgery with axillary dissection +/- lymphedema on affected side (unless urgent condition requires it)
- ◆ Allergy to materials
- ◆ Irradiation of insertion site

(Bard Access Systems, 2016)

Benefits and Risks

Advantages	Disadvantages
<ul style="list-style-type: none"> • Less traumatic to place (reduced intrathoracic or venipuncture complications) • No surgical requirements • Preservation of peripheral vascular system • Cost and time efficient • Reliable long-term access • Decreased peripheral bacterial colonies vs. jugular, thoracic or femoral area • Usually easily removed 	<ul style="list-style-type: none"> • Requires routine sterile dressing and injection cap changes • Care costs on a long-term basis • Some PICCs (small gauge) are not recommended for blood sampling • Patient self-care is difficult • External catheter breakage possible • Body image impact • Activity restrictions • Requires adequate peripheral access • Post-insertion phlebitis common

PERCUTANEOUS CENTRAL LINES



Percutaneous central lines are inserted using a percutaneous approach into the jugular, subclavian, or femoral veins and advanced to the superior vena cava. This type of Central Venous Access Device (CVAD) is indicated for the acute care settings to administer short term therapies (usually less than 1 month). The percutaneous central line is identified by which vein it is inserted in (example: right internal jugular central line).

Location

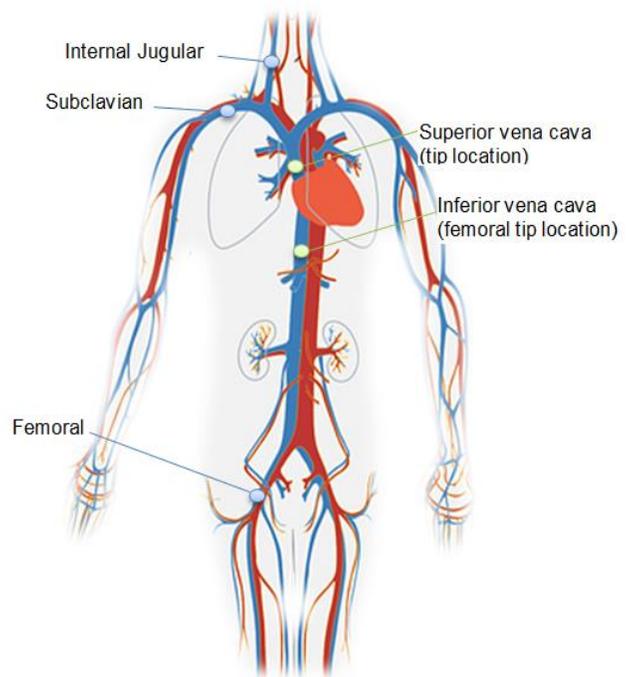
Percutaneous central lines are commonly in the following veins:

External Jugular Vein: On the side of the neck the external jugular is easily recognized. This vein connects to the subclavian vein along the center of the clavicle.

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.

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.

Femoral Vein: The femoral vein is a continuation of the popliteal vein upward toward the external iliac vein. CVADs are sometimes inserted here when other options are limited or in emergency situations. It is a site that is at high risk for infection and mal-positioning or migration.



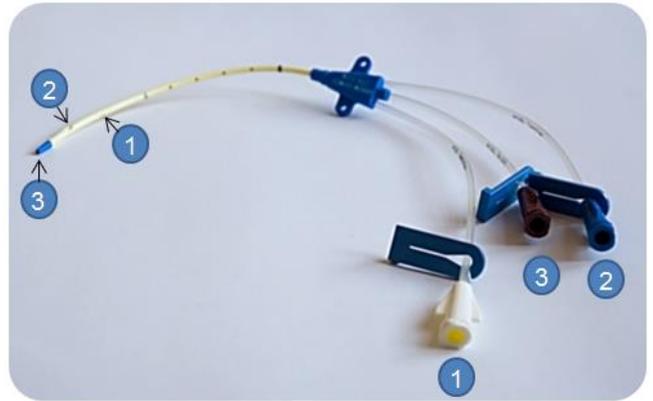
Types

This type of CVAD may have single or multiple lumens with the external catheter segment separating and labeling the lumens so that each lumen can be accessed individually and used as recommended.

Lumens

1. Proximal (White port) - first opening on the catheter tip, closest to the hub
2. Medial (Blue port) - middle open on the catheter tip
3. Distal (Brown port) - opening at the very end of the catheter (ideal for CVP monitoring and blood draws)

Each lumen/line will allow for separate infusions through an individual lumen.



A single lumen percutaneous line is sometimes used in critical care. It is also called a Cordis or Introducer. It is typically used for temporary transvenous pacemakers, or in traumas. They should only be used in critical care areas.



The Cordis must have a minimum of 30 mL/hr. running at all times and cannot be clamped off.

Indications

- Administration of multiple therapies or incompatible medications
- Limited or poor peripheral venous access
- Administration IV Medication Therapy (Including Vasoactive Medication Therapy)
- IV Fluid Replacement (Including critically ill patients requiring fluid resuscitation)
- Central Venous Pressure Monitoring
- Therapy involving frequent blood sampling

Contraindications for Insertion

- Abnormal local anatomy to the area, for example injury, prior surgery, history of radiation
- Infection at insertion site
- Use caution when:
 - Presence of anticoagulation or bleeding disorder
 - Patient is excessively underweight or overweight

Risk and Benefits

Advantages	Disadvantages
<ul style="list-style-type: none"> • Can be inserted at the bedside • Economical • Easily removed • Exchanged over guidewire 	<ul style="list-style-type: none"> • High risk for air embolism and exsanguination (shorter catheter = greater risk) • Uncomfortable for the patient • Routine sterile dressing changes • Difficult to maintain occlusive dressing

NURSING USE AND CARE PICCS AND PERCUTANEOUS LINES

Guidelines and Cautions

- Always use aseptic technique during catheter care and use.
- Never leave the catheter uncapped. Always apply a sterile cap.
- The CVAD & infusion tubing must be securely taped to prevent catheter from migrating in or out.
- Applying a metal clamp (e.g. Kelley®) to a CVAD may cause damage, such as leaking or tearing of the catheter & should never be used outside of an emergency situation.
- Never use acetone or tape remover on or near the catheter; these can dissolve the catheter.
- Keep all sharp objects away from the catheter; no scissors or pins on or near the CVAD.
- Blood pressure measurements should be avoided on limbs with PICCs.

Daily Assessments

When caring for a patient with a CVAD perform the following assessments every shift:

1. Assess insertion site: Inspect the site for bleeding, exudate, leakage, redness
 - a. Upper limbs should be compared for temperature and edema when PICCs are in place
2. Assess catheter tubing: assess for migration, malposition, kinks, and cracks
3. Assess dressing: inspect that the securement and dressing is dry and intact and the change due date is clearly visible
4. Review for need and potential for removal of the CVAD

Accessing a CVAD

Accessing a CVAD must be done aseptically to prevent central line infections.

Procedure:

1. Gather equipment
2. Explain procedure to the patient and family
3. Cleanse cap with alcohol wipe or chlorhexidine (2-3 times) and allow to dry
4. Aspirate blood to check for patency and discard
5. Flush with 20 mL NS with start/stop technique
6. Connect IV tubing
7. Check psi of infusion
8. Document

Flushing a CVAD

Flushing checks for patency and helps to decrease the potential of a partial or complete occlusion.

****To avoid damaging the catheter NEVER use a syringe smaller than 10 mL****

Flush all capped lumens once every 7 days for inactive CVADs and before and after all medications, infusions, and blood draws for CVADs in frequent use.

Procedure:

1. Gather equipment
2. Explain procedure to the patient and family
3. Cleanse cap with alcohol wipe or chlorhexidine (2-3 times) and allow to dry
4. Aspirate blood to check for patency and discard
5. Flush with 20 mL NS using “start/stop” technique to create turbulent flow ensuring the syringe size is 10 mL or larger
6. Document

Drawing blood from a CVAD

1. Gather equipment
2. Explain procedure to the patient and family
3. Stop infusion and flush with 20 mL NS
4. Wait a minimum of one minute
5. Cleanse cap with alcohol wipe or chlorhexidine (2-3 times) and let dry
6. Attach multi-sample vacutainer
7. Obtain a minimum 5 mL blood discard sample
8. Follow order of draw
9. Detach vacutainer and wipe any blood from connector with alcohol wipe
10. Flush all lumens with 20 mL NS
11. Restart any stopped infusions
12. Label blood samples at the bedside with 2 patient identifier
13. Send blood samples as per QHC policy
14. Document

Changing the Dressing and Cap of a CVAD

The dressing is changed within 24 hours of line insertion and then every 7 days and PRN.

1. Gather equipment
 2. Explain procedure to the patient and family
 3. Remove old dressing (work towards center)
 4. Assess vein, insertion site and any related anatomical areas
 5. Clean site with a Chlorhexidine cleanse with a scrubbing circular motion
 6. Allow to dry
- ** The most common cause of phlebitis and skin irritation is from applying the dressing before the area is completely dry. ****

7. Apply clear tegaderm dressing
8. Secure catheter ensuring that the catheter tubing is not kinked or bent at an angle 90° or smaller
9. Label with date of dressing change
10. Document

Cap changes are required every 7 days and typically performed with the dressing change.

1. Gather equipment
2. Explain procedure
3. Prepare equipment (aseptic technique)
4. Cleanse cap and connections with chlorhexidine prior to removal
5. Clamp lumen
6. Remove old cap
7. Fill “dead space” with saline
8. Attach new cap
9. Unclamp lumen
10. Aspirate for blood return
11. Flush with 20 mL NS
12. Remove syringe
13. Clamp lumen if not in use (dependent on PICC type)
14. Document

POTENTIAL CVAD COMPLICATIONS

Complication	Signs & Symptoms	Prevention	Intervention
Inflammation (Phlebitis)	<ul style="list-style-type: none"> • Usually occurs within 7 days after insertion • Pain at site • Erythema • Edema 	<ul style="list-style-type: none"> • Secure dressing after prep solution is completely dry • Change dressing: <ul style="list-style-type: none"> - q 7 days and prn if semipermeable transparent dressing; - q 48 hrs. if gauze dressing • Evaluate patient for other sources of infection (seeding) • Reposition hub prn 	<ul style="list-style-type: none"> • Strict aseptic technique • Warm moist compresses • Assess site frequently • Alert physician of any temperature elevation, signs of infection. • Ensure dressing is secure • Assess patient before PICC insertion for preexisting infections
Occluded Catheter	<ul style="list-style-type: none"> • Unable to flush • Unable to aspirate blood return • Slow/sluggish blood return or infusions. 	<ul style="list-style-type: none"> • Flush promptly after all intermittent infusions, blood draws • Maintain positive pressure in line when not in use 	<ul style="list-style-type: none"> • Assess cause • If blood clot: certified nurses can instill a thrombolytic with a physician order

		<ul style="list-style-type: none"> Assure all flush solutions & drugs are compatible. 	<ul style="list-style-type: none"> If chemical occlusion: inform physician to consider PICC line removal
Septicemia, central line infection	<ul style="list-style-type: none"> Chills Fever Headache Malaise Glucose intolerance Backache Nausea & vomiting Vascular collapse Shock Death 	<ul style="list-style-type: none"> 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/ temp 	<ul style="list-style-type: none"> Stop infusion & notify physician if Temp greater than 38°C Administer therapeutic interventions as ordered If discontinuing PICC line, send tip for culture
Broken Catheter	<ul style="list-style-type: none"> Leakage of fluid, blood from catheter or dressing 	<ul style="list-style-type: none"> Keep sharps away from catheter Check position of clamps before flushing Do not use syringes smaller than 10mL 	<ul style="list-style-type: none"> Clamp catheter with toothless clamp below break towards chest wall Repair or replace
Embolism <ul style="list-style-type: none"> Clot, catheter segment, or air becomes free-floating in blood & propelled into Pulmonary Artery 	<ul style="list-style-type: none"> (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 	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Administer O2 per orders Notify physician immediately Administer Meds as ordered Air Emboli: <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> jugular vein distention, peripheral edema, dyspnea, agitation, tachypnea, cough, crackles heard in lung bases, 	<ul style="list-style-type: none"> I&Os use pumps for infusions, especially if client history of CHF, renal failure Do not attempt to catch up if IV fluids behind schedule and notify physician of noted signs/symptoms 	<ul style="list-style-type: none"> Stop infusion High fowler's position, Monitor Vital signs. Administer O2 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 CVAD tip advances proximally into the heart or distally CVAD tip withdraws out of distal SVC	Proximally <ul style="list-style-type: none"> • Atrial or ventricular arrhythmias, short of breath, palpitations, cardiac tamponade if infusion into myocardium • Distally: Patient hears swishing / gurgling in same side ear when flushing (tip in jugular vein), infiltration / extravasation 	<ul style="list-style-type: none"> • Careful securement of CVAD at time of insertion • Continue to secure location with securement device each dressing change • Measure & document external catheter length • Do not use CVAD if migration is suspected until tip location confirmed by x-ray 	<ul style="list-style-type: none"> • 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 be advanced
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, pruritus, nausea, vomiting, abdominal cramps, diarrhea, incontinence, rapidly falling BP, chills, diaphoresis, weakness, thready pulse, dizziness, flushing & pallor, drowsiness, agitation, anxiety, shaking, throbbing in the ears,	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 • Document sequence of events and care provided • Note new allergy in patient health record

	paresthesia, coma, death		
DVT	redness, pain, swelling on the same side as PICC, edema distal to insertion site, difference in color & temperature of extremities between affected and unaffected sides, vein engorgement on affected side	<ul style="list-style-type: none"> • Appropriate use of cannulated arm, securely anchor cannula to prevent movement in situ, • Be aware of patients with hypercoagulable states • Frequent site inspections, with thorough comparison of both arms during head to toe assessments, 	Notify physician of Signs and symptoms Administer therapies as ordered

QUICK REFERENCE

CVAD Line Care	Management
Assessments	<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 ✓ Assess dressing: inspect that the securement and dressing is dry and intact and the change due date is clearly visible ✓ Review for need and potential for removal of the CVAD
Syringe size	✓ 10 mL or larger
Flushing	<ul style="list-style-type: none"> ✓ Flush all capped lumens with 20 mL saline every week and 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 and 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 PICC while transferring blood or getting more equipment – flush first
Dressing change	✓ 24 hours after insertion then every 7 days
Cap change	✓ Every 7 days

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CVAD QUIZ

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

1. PICC lines are suitable for which of the following?
 - a. Long term vascular access for blood sampling
 - b. Chemotherapy
 - c. Long term antibiotic administration
 - d. TPN
 - e. All of the above

2. When blood sampling from an adult with a central line, a discard volume of _____ must be drawn pre-sample, with a _____ post-sample flush.
 - a. 5mL, 10mL
 - b. 5mL, 20mL
 - c. 10mL, 10mL
 - d. 20mL, 10mL

3. If the catheter appears infected, do all of the following EXCEPT:
 - a. Swab discharge and send for culture and sensitivity
 - b. Send catheter tip for culture and sensitivity
 - c. Assess patient for signs of systemic infection
 - d. Leave the site open to air to assist drainage

4. The tip of the CVAD 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

5. When accessing a CVAD, always use at least a _____ - sized syringe.
 - a. 3 mL
 - b. 5 mL
 - c. 10 mL
 - d. 20 mL

6. Percutaneous Central lines are only placed in a femoral vein when:
 - a. The patient requests it
 - b. An emergency situation requires it
 - c. A PICC line is not available
 - d. A transvenous pacemaker is required

7. How much Normal Saline is used to flush a lumen after administering a medication through a CVAD?
 - a. 5 mL
 - b. 10 mL
 - c. 20 mL
 - d. 60 mL

- 8.** A transparent film dressing on a CVAD insertion site is usually changed every:
- a. 24 hours
 - b. 48 hours
 - c. 7 days
 - d. 10 days
- 9.** Chest pain, shortness of breath and cyanosis are signs of:
- a. a localized PICC-related infection
 - b. Pinch-Off Syndrome
 - c. a venous thrombosis
 - d. an embolism
- 10.** A turbulent, pulsating flush method is used when flushing a PICC 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