



## *Nursing Professional Development*

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# *Central Venous Access Device (CVAD) Removal*

## *Resource Manual*

*Quality, Patient Safety & Interprofessional Practice  
January 2019*

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*Together...supporting quality care*



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## Certification Criteria

Registered Nurses at Quinte Healthcare Corporation (QHC) will be certified to remove percutaneous central catheters and peripherally inserted central catheters (PICC's) if they have completed the following:

1. Attendance at a theory session focused on Central Venous Access Device (CVAD) removal.
2. Achieve a minimum of 80% on the Central Line Removal certification test (Appendix B).
3. Supervision by a certified nurse who has achieved and maintained competence in this skill.
4. Completion of the skills checklist for each supervised removal (Appendix A).

## 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).

## Introduction

What is a Central Venous Access Device (CVAD)?

1. A central venous catheter that is inserted **centrally** through the subclavian, internal jugular, or femoral vein, or **peripherally** through the basilic or cephalic vein (peripherally inserted central catheter: PICC). Central Lines may be tunneled or non-tunneled, which refers to how the line is inserted. A tunneled catheter is one in which a tunnel is made through the subcutaneous tissue, then the catheter is inserted through the tunnel and into the vein, such as a subclavian central line. Tunneled catheters are normally placed when longer-term use is required. Non-tunneled catheters are generally used for shorter term and/or emergency treatment. They are inserted directly into the vein and threaded into the superior vena cava from the point of insertion, including PICC lines, femoral, external and internal jugular lines. For **all** central catheters, the distal end of the catheter is positioned in the lower one third of the superior vena cava.
2. A venous introducer sheath (Cordis) is also a central line. At QHC a Cordis is most commonly utilized as a sheath to introduce a transvenous pacer wire. A Cordis is also used for introduction of a pulmonary artery catheter, and can be used as a large bore central line in trauma patients for rapid large volume fluid infusion. A Cordis is most commonly inserted through the internal jugular vein.

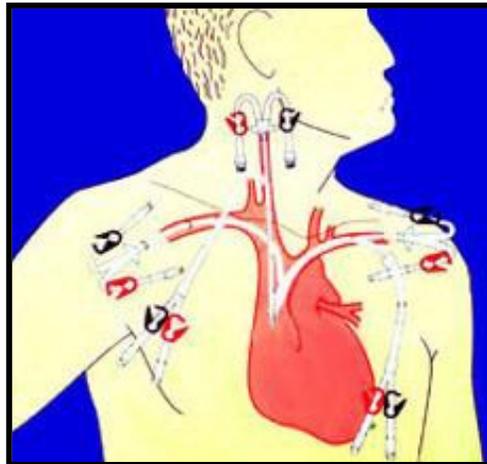
Central venous catheters that **can be** removed on a physician's order by the authorized RN are: Non-tunneled central venous catheters (CVAD) that are inserted centrally through the following veins:

- internal jugular
- external jugular
- subclavian
- femoral
- PICC
- Introducer sheath/Cordis (pacing wire or pulmonary artery catheter not present)

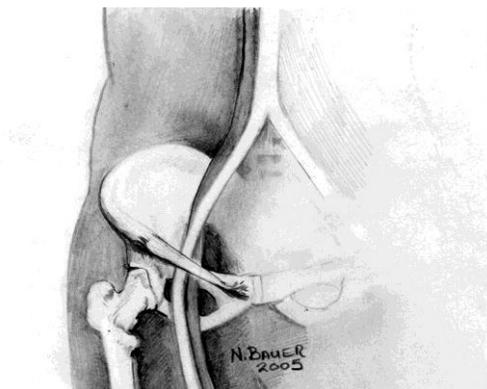
**NOTE: RNs at QHC may not remove tunneled catheters, port-a-caths, pulmonary artery catheters or pacer wires**

## Anatomy

Jugular and subclavian access sites for central lines



Femoral access site for central lines



PICC access for central lines



## Equipment

Removal of a CVAD is an aseptic (clean - not sterile) procedure.

Hand washing and application of non-sterile gloves is required.

- Sterile dressing tray
- Suture removal set
- Chlorhexidine
- Sterile gauze
- Clean gloves
- Transparent occlusive dressing
- Swab (for wound culture)
- Sterile specimen container (if sending tip for C&S)
- Measuring tape (if PICC length available)

## Central Line Removal Procedure

Procedural Step	Rationale
1. Ensure there is a written Physician Order for removal. Review the patient's coagulation status (most recent INR, platelets) if applicable (for IJ and patients on anticoagulants). If abnormal, confirm removal Order with physician. *For PICC lines, confirm catheter length by looking at insertion label in patient chart (if inserted at QHC). If length of catheter is unknown, tip inspection is relied upon to ensure intact catheter has been removed.	<ul style="list-style-type: none"> <li>• A Physician's Order is required for removal of CVADs</li> <li>• Anticoagulated patients and those patients with Internal or External Jugular or Femoral lines have a higher risk of hemorrhage post removal, and there is more difficulty to apply direct pressure to these areas to provide hemostasis</li> <li>• Catheter length is measured upon removal to ensure whole catheter has been removed.</li> </ul>
2. Confirm you have the correct patient through the 2 Patient Identifier process.	<ul style="list-style-type: none"> <li>• 2 Patient Identifier Procedure is a Required Organizational Procedure (ROP) and ensures care is provided to the right patient at the right</li> </ul>
3. Obtain vital signs prior to removal.	<ul style="list-style-type: none"> <li>• Determines the patient's physiological baseline</li> </ul>
4. Explain procedure to patient and place linen-saver pad under the insertion site. Place patient in a supine position, with insertion site below the level of the heart.  *For PICC removal position arm at a 45-90° angle to the body.  *For Femoral line, obtain a chair or stool to sit on during removal procedure.	<ul style="list-style-type: none"> <li>• Information provided to patient reduces anxiety</li> <li>• Risk of air embolism increases when insertion site is above the level of the heart</li> <li>• Abduction of arm results in straighter vessel and less trauma during PICC removal</li> <li>• Seated position allows the withdrawal of the femoral line in a position parallel to the insertion site (not angled too high during removal) to prevent vessel trauma</li> </ul>
5. Wash hands. Prepare dressing tray. Use sterile technique to add Chlorhexidine and drop contents of the suture removal set onto the tray.	<ul style="list-style-type: none"> <li>• Adherence to infection control guidelines and the 4 moments of hand hygiene</li> </ul>

Procedural Step	Rationale
6. Remove dressing. Note any drainage from insertion site. Cleanse site with normal saline to remove skin flora then obtain culture if required.	<ul style="list-style-type: none"> <li>• Cleansing of site prior to culture ensures that sample is not contaminated with skin flora</li> </ul>
7. Remove gloves and perform hand hygiene. Don clean gloves. Using sterile gauze, cleanse the insertion site with chlorhexidine and allow to dry completely (2 minutes).	<ul style="list-style-type: none"> <li>• Chlorhexidine is the recommended agent for disinfecting vascular access sites</li> <li>• Drying time is required for chlorhexidine to be effective</li> </ul>
8. Remove sutures (if present).	
9. Gently hold 4x4 gauze over insertion site.	<ul style="list-style-type: none"> <li>• Gauze applied with light pressure minimizes the risk of bleeding and air embolism as catheter is removed.</li> </ul>
<p>10. Instruct the patient to:</p> <ol style="list-style-type: none"> <li>1. Take a deep breath, then exhale slowly pushing out the air as catheter is removed (Valsalva manoeuver).</li> <li>2. For mechanically ventilated patients, or those unable to hold their breath, perform catheter removal at the end of inspiration, as exhalation phase is beginning.</li> </ol>	<ul style="list-style-type: none"> <li>• Valsalva manoeuver creates increased intrathoracic pressure which helps decrease the risk of air embolus</li> </ul>
<p>11. Gently withdraw the catheter while applying gentle pressure with the sterile gauze. *If <b>resistance</b> is encountered, <b>do not force</b>. Tape the catheter in place and notify the physician.</p> <p>Once catheter is completely removed, <b>apply firm direct pressure</b> for a minimum of <b>5 minutes</b>, over the insertion site.</p>	<ul style="list-style-type: none"> <li>• Smooth steady withdrawal decreases the risk of catheter breakage.</li> <li>• Firm, direct pressure over the site decreases the risk of hemorrhage</li> </ul>
<p>12. Inspect the tip of the catheter to ensure the catheter is intact.</p> <p>If a catheter tip culture is required, snip it off with sterile scissors and place in a sterile container.</p>	<ul style="list-style-type: none"> <li>• The nurse must ensure the CVAD is intact upon removal. If a piece of the catheter has broken off, a tourniquet is applied immediately to the upper arm to prevent migration and physician notified immediately.</li> </ul>
<p>13. After 5 minutes if bleeding has stopped, apply a transparent occlusive dressing over the site and maintain for 24 hours. Monitor for bleeding as per post removal care (page 7).</p>	<ul style="list-style-type: none"> <li>• To prevent air embolism and infection as site heals</li> <li>• Sterile antiseptic ointment or sterile Vaseline may be applied but is optional – ensure site is well occluded to prevent air embolism and infection</li> </ul>
<p>14. Perform patient teaching and Document the removal procedure.</p>	<ul style="list-style-type: none"> <li>• See page 7 for patient monitoring/patient care post removal, patient education and documentation requirements</li> </ul>

## Documentation

Document the following:

- Date and time of removal
- Reason for removal
- Condition of catheter and length
- Collection of catheter tip specimen for culture, if ordered
- Patient response
- Application of dressing
- Condition of catheter exit site and monitor for bleeding as per post care removal (below)

## Patient Care Post Removal

### Central Line Catheter (Subclavian, Jugular, Femoral) Removal

After removal, observe patient in supine position for 30 minutes.

After removal, monitor respiratory status and assess for bleeding q5minutes x 6, then q1h x 3  
For femoral lines, prevent hip flexion for 2 hours post-removal.

### Peripherally Inserted Central Catheter (PICC) Removal

Monitor respiratory status and assess for bleeding at 5 minutes post-removal and then at 15 minutes post-removal.

## Patient Education Post Removal

Instruct your patient to do the following:

- Notify physician if redness increases, and swelling, drainage or discomfort
- May remove dressing after 24 - 48 hours
- If PICC removed due to phlebitis, apply warm compress for 20 minutes, 4 times a day

### Potential Complications Associated with CVAD Removal

Problem	Signs / Symptoms	Interventions
<b>Venous Spasm</b>	Sudden resistance or sharp pain over vein track	<p>Stop withdrawal immediately.            Reposition arm and try again.            If resistance continues, apply warm compress to arm for 20 minutes before gently retrying removal            If resistance continues, tape in place and alert physician</p>
<b>Air Embolism</b>	Cyanosis, respiratory distress, hypotension, feeling of impending doom, may experience cardiac arrhythmias or loss of consciousness	<p>Occlude air entry point (insertion site)            Place patient in left side-lying trendelenberg position            Administer 100% oxygen            Obtain medical assistance immediately</p>
<b>Bleeding/Hematoma</b>	<p>Swelling with or without skin discoloration indicates bleeding continues beneath the skin            Visible blood or bruised appearance beneath skin tissue near insertion site            Discomfort</p>	<p>Apply firm direct pressure until bleeding stops            Alert physician to assess patient</p>
<b>Catheter Fracture</b>	<p>Catheter will not be intact upon removal            Fragment could become embolism and cause symptoms as an air embolism (above)</p>	<p>To prevent catheter breakage, never continue to pull if resistance occurs            If piece of catheter remains inside arm, apply tourniquet at highest point around upper arm – tight enough to occlude venous blood flow but not arterial (check for presence of radial pulse)            Place patient in high fowler’s position and contact physician immediately            If signs/symptoms of embolism, treat as air embolism above</p>

## References

Hadaway, L. (2013). *Sheehy's Manual of Emergency Care (7<sup>th</sup> ed.)* St. Louis, Missouri: Mosby Elsevier. 97-119.

London Health Sciences Centre (2010, revised July 2017). Procedure for removal of central venous catheters (jugular, subclavian or femoral).

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### Appendix A

<b>COMPETENCY CHECKLIST FOR CVAD REMOVAL</b>			
	Yes	No	Comment
1. Check Patient’s Coagulation status (most recent INR, platelets, if on anticoagulants and/or if central line is in internal jugular vein). If abnormal, confirm Order for central line removal with physician prior to initiating removal procedure. *For PICC line, check length of catheter as recorded in patient chart (to be compared after removal).			
2. Collect appropriate equipment.			
3. Wash hands. Apply clean gloves.			
4. Confirm you have the correct patient by performing 2 patient identifier process. Explain the procedure to the patient.			
5. Place patient in supine position.			
6. Turn off all infusions and remove central line dressing.			
7. Inspect insertion site for signs of infection. Collect swab if signs of infection present.			
8. Cleanse site with Chlorhexidine. Allow to air dry.			
9. Remove suture(s).			
10. Place sterile gauze pad over insertion site. Hold gauze gently over site during removal of central line.			
11. Explain and demonstrate Valsalva maneuver to patient. Ask patient to perform Valsalva while smoothly and gently removing central line.			
12. Once central line is removed, press firmly and directly over the site for a minimum of five minutes. Check cannula for integrity. Ensure tip of catheter is intact. If PICC length is known, measure catheter once removed.			
13. After 5 minutes of firm pressure, check the site to ensure there is no visible bleeding.			
14. Apply pressure dressing to the site. An occlusive dressing with 2x2 gauze and Opsite is acceptable. Vaseline infused adaptic may be used if available. Whichever method, ensure seal is obtained.			
15. If C&S of the tip is required, place catheter on sterile field upon removal, then cut the tip using sterile scissors and place in sterile collection container.			
16. Remove and discard gloves. Perform hand hygiene.			
17. Document: <ul style="list-style-type: none"> <li>• Date and Time of removal</li> <li>• Site appearance</li> <li>• Catheter appearance and length</li> <li>• Culture (s) if taken and sent</li> <li>• Type of dressing applied</li> <li>• Patient’s tolerance of procedure</li> </ul>			

Date: _____	Time: _____	RN Preceptor: _____
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Date: _____	Time: _____	RN Preceptor: _____
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On Completion Present this Form to Your Manager

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**Appendix B****Central Line Removal Certification Test**

1. Certified Registered Nurses cannot remove
  - a. Internal jugular catheters
  - b. Pulmonary artery catheters
  - c. Femoral catheters
  - d. None of the above
  
2. Common venous sites for central lines include
  - a. Internal jugular, subclavian, basilic, anterior tibial, cephalic
  - b. Subclavian, femoral, innominate, basilic, cephalic
  - c. Brachial, internal jugular, tibial, basilic, cephalic
  - d. Internal jugular, basilic, subclavian, femoral, cephalic
  
3. When removing the catheter
  - a. Quickly remove with a strong, firm pull
  - b. Slowly withdraw while the patient performs the Valsalva manoeuvre
  - c. Slowly withdraw while the patient slowly inhales
  - d. Apply very strong manual pressure over the removal site
  
4. Following removal of a central venous catheter or sheath, apply manual pressure directly over the site for a minimum of
  - a. One minute
  - b. Three minutes
  - c. Five minutes
  - d. Fifteen minutes
  
5. Observe the removed catheter for all except
  - a. Patency
  - b. Rough edges
  - c. Contamination
  - d. Length
  
6. If the catheter appears infected do all of the following except
  - a. Swab insertion site and send for culture and sensitivity as ordered
  - b. Send catheter tip for culture and sensitivity as ordered
  - c. Notify physician
  - d. Leave site open to air

7. Possible complications of central line removal include
  - a. Tachycardia
  - b. Air embolus
  - c. Tinnitus
  - d. Urticaria
  
8. To prevent air emboli when removing the catheter
  - a. Place the patient in a prone position prior to removal
  - b. Have the patient exhale through the mouth during removal
  - c. Cover the site with an occlusive dressing following removal
  - d. a and b
  - e. b and c
  
9. The usual insertion site for a peripherally inserted central catheter (PICC) is the
  - a. Basilic/cephalic vein
  - b. Subclavian vein
  - c. Right atrium
  - d. Innominate vein
  
10. Common types of central line include
  - a. Single lumen
  - b. Multiple lumen
  - c. Venous introducer sheath
  - d. All of the above