CHATHAM-KENT Health Alliance

CKHA POLICY and PROCEDURE

Title:	Central Venous Access Device (CVAD)		**Document Number:** PTC-1-097
Approved by:	Senior Leadership Team (SLT)	**Date Revised:**	July 29, 2024
Policy Owner:	Professional Practice	**Date of Origin:**	February 1, 1999

BACKGROUND

Central venous therapy involves the placement of a flexible catheter that is inserted under sterile conditions into a peripheral or central vein with the tip lying in the superior vena cava/right atrial junction or inferior vena cava (femoral insertion). Types include Non-Tunneled, Peripherally Inserted Central Catheters, Tunneled Central Venous Catheters, and Implanted Venous Access Ports. They may be used for introduction of intravenous fluids, total parenteral nutrition (TPN), medication, blood/blood products into the venous system, withdrawal of venous specimens, and provide a site for central venous pressure monitoring. The best catheter option for the patient depends on the type, duration, nature and complexity of the therapy, patient diagnosis, condition, and the ability to manage the device.

OUTCOME

The objective is to build a group of proficient Registered Practical Nurses (RPNs) and Registered Nurses (RNs) capable of safely managing and caring for central venous access devices.

SCOPE OF PRACTICE

- Central venous access devices (CVADs) must be cared for in accordance with respective regulatory procedures and practice guidelines.
- All Registered Nurses (RNs), Registered Practical Nurses (RPNs), and Regulated Health Care Providers (RHCPs) must obtain and maintain knowledge, skill, competency, and judgement specific to vascular access and infusion therapy.
- Perform tasks only when one has the knowledge, skill, competency, and judgement and seek assistance promptly, as appropriate.
- CVADs and infusions must be cared for according to this policy, **excluding hemodialysis CVADS.**

COMPETENCIES

REGISTERED PRACTICAL NURSES (RPN)

Basic Competency

- Maintenance of established infusion, including monitoring, intake, and output, and replacing continuous IV infusions
- Infusion of IV medications according to scope of care and the Parenteral Drug Administration Manual (PDAM)

CVAD Certification for RPN includes

- Review of the Central Venous Access Device Learning Guide
- Attend CVAD in-class and simulation practice provided by the Professional Practice Team (PPT) and demonstrate acceptable knowledge and performance of skills
- Achieve 80% on the written test
- Submit completed performance checklist to PPT

Following CKHA CVAD Certification and Sign-Off:

- Access CVAD for blood specimen collection
- Flush and initiate IV infusion therapy
- Perform needle-free connector change
- IV administration set change
- Dressing change/securement device change
- Insertion and removal of a Huber needle for the purpose of accessing a totally implanted port for blood sampling and IV infusion/medication administration

Maintenance of Ongoing Competence:

- Accountability to maintain knowledge, skill, and ability lies with the individual nurse
- If the ability to use the skill is not frequently available, in-service is available through the PPT

REGISTERED NURSES (RN)

Basic Competency

- Maintenance of established infusion, including monitoring, intake, and output, and replacing continuous IV infusion solutions
- Infusion of IV medications according to scope of care and the Parenteral Drug Administration Manual (PDAM)

CVAD Certification for RN includes:

- Review of the Central Venous Access Device Learning Guide
- Attend CVAD in-class and Simulation practice provided by the PPT and demonstrate acceptable knowledge and performance of skills
- Achieve 80% on the written test
- Submit completed performance checklist to the PPT

Following CKHA CVAD Certification and Sign-Off:

- Access CVADs for blood specimen collection
- Flush and initiate IV infusion therapy
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- Dressing change/securement device change
- Insertion and removal of a Huber needle for the purpose of accessing a totally implanted port for blood sampling and IV infusion/medication administration
- Perform Non-Tunneled Percutaneous Centrally Inserted Catheter and PICC Line removal. **NOTE: MRP order must be present**
- **Before discontinuing the PICC line, confirm that vascular access is no longer required. If the order for removal is due to malfunction, ensure the DI nurses have been contacted to determine if a PICC exchange is possible.**

- Following completion of online learning and following direction of the PDAM: attempt to lyse a thrombotic CVAD occlusion with Alteplase *(Cathflo)*
  NOTE: MRP order must be present

Maintenance of Ongoing Competence:

- Accountability to maintain knowledge, skill, and ability lies with the individual nurse
- If the ability to use the skill is not frequently available, in-service is available through the Professional Practice Team

CVAA Certified RNs with Additional Training

- RNs who maintain current certification through the Canadian Vascular Access Association (CVAA), practice in DI, and who have had additional training with the Interventional Radiologists may:
  - Insert a PICC device under fluoroscopy in DI under the supervision and responsibility of the Radiologist
  - Repair a PICC device, when possible, under a physician's order
  - Exchange a PICC device under a physician's order
  - Remove a PICC device under a physician's order

POLICY

- Obtain informed consent (written, verbal, or implied) prior to performing vascular access and/or infusion therapy.
- Use infection prevention strategies to reduce healthcare associated infections for all CVAD access and infusion therapy procedures.
- Follow documentation requirements (date, time, user ID, procedural details, barriers to care, evaluation of suspected outcomes, side effects, and adverse events, including intervention and patient response).
- DI Nurse will use ultrasound for vessel assessment and insertion.
- Consider CVAD exchange as a site preservation strategy for malposition, malfunction, when a different CVAD is indicated, when other sites are limited or unavailable.
- The distal tip location must be radiologically confirmed before initial usage and whenever catheter migration is suspected.
- Radiological confirmation prior to the administration of a thrombolytic **(only if complication or catheter migration is suspected)**.
- If CVAD patency is not restored after the administration of Cathflo: notify MRP and consider alternative actions such as radiography (to rule out catheter tip malposition) and/or referral to interventional radiology.
- Prior to infusing any medications or fluids, the patency of the CVAD lumen will be confirmed by ensuring that there is no resistance experienced when gently flushing the lumen with preservative free sterile 0.9% NaCl using a 10mL syringe. Ideally, free-flowing blood return when aspirating with a syringe also confirms patency, however a partially occluded lumen tip may allow infusions without resistance but negate blood aspiration.
- **Exception to Above: Accessing a Totally Implanted Port**

  - Free-flowing blood withdrawal upon aspiration **and** no resistance experienced with gentle normal saline flush are necessary requirements/conditions prior to use.
  - This process will confirm the non-coring needle is placed correctly and that the lumen remains patent.
- Each lumen of the CVAD will be treated as a separate line, flushed separately according to its own schedule, and documented separately.
- Outpatient areas may use Heparin Flushes **as ordered by physician** and must be documented on the patient's MAR (commonly seen in locking totally implanted vascular access devices *i.e. ports*, patients with high-risk of catheter-related infections, patients with recently implanted cardiac devices, and patients with high-risk of central line-associated bloodstream infections.)
  NOTE: ONLY 0.9% Sterile Saline will be used in all other areas.

PROCEDURE
Refer to Central Venous Access Device Learning Guide located on iCKHA or obtain a copy from the PPT and/or Dynamic Health

1. **Insertion**
   a. Strict aseptic technique, sterile gloves, masks, gowns, and full sterile patient drape.
   b. Position the patient to increase venous distention, and increase intrathoracic pressure, minimizing risk of air embolism (Trendelenburg position, Valsalva maneuver).
   c. **Valsalva maneuver:** inhale, hold breath and bear down as if having a bowel movement (risk of air emboli is lessened if catheter lumen is opened when patient bears down).
   d. If the patient cannot perform a Valsalva maneuver, open catheter only during exhalation.
   e. A chest X-ray is needed to confirm the correct catheter tip location prior to initiating the prescribed therapy. Tip should be in the lower third of the superior vena cava (cava-atrial junction) or if placed in femoral vein tip, should be in inferior vena cava at the level of the diaphragm.
   f. Femoral lines in adults are typically used in emergency situations and every effort should be made to remove femoral lines within 24-48 hours.
   g. Measure and document the external length of the catheter on the patient's EMR.
2. **Post Insertion Care and Maintenance for First 24 hours**
   a. Confirm line placement by documentation from Radiologist/MRP. Do not use line until placement is confirmed. For CVADs placed at the bedside, confirm placement using a portable chest x-ray as ordered.
   b. Assess site every 4 hours post-insertion and document site assessment.
   c. For CVADs that have been dressed with gauze and/or non-transparent dressings, the dressing must be changed within 24 hours post-insertion.

3. **Assessment Frequency**
    a. The assigned nurse responsible for completing an assessment of the CVAD:
        i. At least once a shift when not in use
        ii. Pre/post lumen access
        iii. A minimum of every two hours when on continuous infusions or more frequently depending on the agents being administered (i.e., chemotherapy, vasopressors)
        iv. For outpatient areas the CVAD will be assessed at each clinic visit
4. **Assessment**
    a. Assess clinical need for CVAD daily and remove when no longer required **NOTE: MRP order required for removal**
    b. Assess patency of CVAD
    c. Assess the skin integrity at CVAD insertion/exit site through the dressing
    d. Visualize and palpate for signs and symptoms of complications at the site and along the CVAD pathway (i.e., swelling, leaking, redness, warmth, cording, drainage)
    e. Verify dressing and/or method of securement is intact to prevent dislodgement
    f. Ask the patients if they are experiencing any symptoms of discomfort, tenderness, pain, tingling, or numbness
    g. Assess site without removing non-transparent dressing between dressing changes if no clinical signs or symptoms of complication
    h. Remove gauze or opaque dressing to allow thorough examination of site ONLY if the patient has fever, tenderness at insertion site, or other signs or symptoms of infection
    i. Confirm clamp is present on non-valved CVAD and clamp(s) engaged when not in use
    j. Ensure documentation is provided including external length, condition of site, dressing, securement method, and any abnormal findings (i.e., phlebitis, pain)
5. **Skin Antisepsis**
    a. Chlorhexidine 2%/Alcohol 70% for both skin prep and access sites
    b. Use alternative skin antiseptic (i.e., tincture of iodine, iodophor, 70% alcohol) if there is contraindication, allergy, or sensitivity to chlorhexidine in alcohol
    c. Use a single-use application product instead of a multi-use product to provide skin antisepsis and dispose after use
    d. Use a friction scrub for at least 30 seconds with repeated up-and-down and side-to-side motion
    e. Allow for adequate dry time
6. **CVAD Securement**
    a. Use sutureless securement to limit movement of CVAD
    b. Use sutures only for tunneled CVAD post-insertion
    c. Ensure securement method does not compromise ability to perform site assessment, limit vascular circulation, or impair skin integrity
    d. Assess integrity of securement device on an ongoing basis and replace with every dressing change and when compromised

7. **Dressing Change**
    a. Maintain sterile dressing on CVAD
    b. Strict aseptic technique, including mask and sterile gloves required for dressing changes
    c. Assess skin integrity with each dressing change
    d. Measure and document the external length of the catheter with each dressing change to compare with previously documented length. Notify physician of any changes.
    e. Transparent film dressing (i.e. Tegaderm) is the preferred dressing (to allow for continuous observation and assessment)
    f. Use sterile gauze or absorbent dressing if patient is diaphoretic or if site is bleeding or draining until appropriate for sterile transparent film dressing
    g. Consider use of hemostatic agent (to control bleeding and reduce need for additional dressing changes)
    h. Label the dressing with the date, time, and initials of the nurse performing the dressing change
    i. Upon initial insertion dressing is to be changed within 24 hours
    j. Change transparent dressing every 7 days
    k. Change securement device with every dressing change and when compromised
    l. Change non-transparent dressing every 2 days and when compromised
    m. Transparent dressing over gauze is considered a gauze dressing and is changed every 2 days and when compromised
8. **Positive Pressure Injection Cap Change**
    a. A positive pressure injection cap is secured to each CVAD lumen, and changed weekly or sooner if blood or residue is observed in the valve
9. **Non-Coring Needle Change for Ports**
    a. The non-coring Huber needle, used for totally implanted ports, is changed weekly when used for continuous infusions
10. **Patency/Flushing/Locking**
    a. Assess patency of CVAD by flushing without resistance and aspirating blood without resistance
    b. Flush CVAD and confirm patency at established intervals:
        i. Immediately prior to starting infusion
        ii. Between incompatible solutions and/or medications
        iii. With needle-free connector/administration set change
        iv. Before and after blood sampling or administration of blood products
        v. With TPN tubing changes
        vi. When there is any residue in the catheter or needle-free connector
        vii. When it is perceived that the flow in the line is reduced
        viii. Daily with continuous infusions
        ix. Every 7 days if not in use
        x. Monthly (not accessed/not in use) for implanted vascular access device (Port)
    c. Flush with sterile preservative-free 0.9% sodium chloride

d. No smaller than a 10mL syringe is to be used to prevent pressure and catheter damage
e. A push-pause technique will be utilized to flush
f. Do not apply excessive force to flush line
g. Clamping:
    i. Positive displacement: clamp after syringe removal
h. Document CVAD function, flushing without resistance, and presence of blood on aspiration

11. Lumen Usage

a. Reserve the largest distal port for blood administration, blood sampling, CVP monitoring
b. Any lumen may be used for fluids, medications, blood, blood sampling, and TPN
c. Dedicate a lumen if infusing TPN
d. Take precautions to minimize risk of air embolism during catheter insertion and removal, and whenever catheter is open to air (i.e., changing infusion caps, IV tubing)These precautions include:
    i. Closing the clamp
    ii. Position the patient to increase venous distention and increase intrathoracic pressure (i.e., Trendelenburg position, Valsalva maneuver)
    iii. Opening lumen only on expiration

12. Infusion Pumps

a. An infusion pump is required for all CVAD infusions

13. Power Injection

a. Use CVAD for power injection only when identified as a manufacturer-rated for power injection (this may be seen by unique identifier labeled as “CT” as seen on radiographic image, documentation, or by the max infusion rate on the lumen itself).
b. Confirm CVAD patency before and after use with power injector.
c. During and after power injection, assess for signs of rupture (i.e., extravasation, catheter embolism).
d. Assess needle placement, and surrounding skin after power injection to ensure needle was not dislodged and is still safe for infusion therapy.

14. Blood Specimen Collection

a. Prior to blood sampling from CVAD:
    i. Stop all infusions for at least one minute (unless contraindicated, then notify lab and MRP infusion could not be held)
    ii. Clear catheter lumen with sterile preservative-free 0.9% sodium chloride
    iii. Flush with 10mL of sterile preservative-free 0.9% sodium chloride
    iv. Discard at least 6mL for adult patients
b. Avoid obtaining blood samples from lumen used for TPN if possible
c. Flush CVAD post-collection with 20mL of sterile preservative-free 0.9% sodium chloride

15. Blood Cultures

a. Time blood culture draw from CVAD and peripheral vein as close together as possible

b. Do not draw blood cultures from CVAD unless suspected as source of infection
c. Draw blood cultures before all other samples and prior to antibiotics being administered whenever possible
d. Document specific source (i.e., Red Lumen) and time of blood culture
e. Do not flush (if possible) or draw discard prior to blood culture sample
f. Do not draw blood through existing needle-free connector (to reduce risk of contamination from device colonization). Remove and replace needle-free connector before blood sampling.
g. Do not directly connect blood culture bottle to CVAD using holder, due to risk of reflux of culture medium into line. Use luer lock syringe to collect 10mL for culture bottle and transfer using transfer device.
h. Flush with 20mL sterile preservative-free 0.9% sodium chloride or until needle-free connector and extension set are clear.

16. Removal of Non-Tunneled Central Venous Catheters *(competency/policy)*

a. CVADs should be removed when clinically indicated based on assessment and/or clinical signs and symptoms of complications, CVAD dysfunction, or when no longer required.
b. Replace CVAD within 24-48 hours if inserted under non-aseptic situations.
c. Notify MRP about signs and symptoms of suspected catheter-related infection (CRI) prior to removal to assess need for obtaining cultures.
d. Do not remove CVAD based solely on length of dwell time, as optimum dwell time is unknown.
e. Do not remove CVAD solely based on presence of CVAD-associated thrombosis
f. Consult with the healthcare team if malposition suspected
g. Document device removal and reason, including site condition, CVAD length, interventions, and plan to address any ongoing complications.
h. Use caution in removal of CVAD, including measures to prevent air or catheter embolism:
    i. Place patient in position that CVAD is at, or below the level of the heart:
        - Supine or semi-Fowler's position for PICC, maintaining exit site below level of heart
        - Supine or Trendelenburg position for non-tunneled CVAD
i. Have patient perform Valsalva maneuver (optional for PICC), unless contraindicated. If contraindicated, place patient on left side in Trendelenburg position, or complete removal at the end of inspiration.
j. Request patient to remain in a flat or reclining position for 30 minutes after removal.
k. Do not pull against resistance when removing CVAD.
l. Consider extending the arm at 90 degrees from torso when removing PICC (to decrease resistance).
m. Apply direct continuous firm digital pressure to exit site after removal until hemostasis has been achieved:
    i. For **PICC, non-tunneled** and **tunneled CVAD** use sterile petroleum-based dressing (i.e. Bactigras) and sterile gauze

n. Once hemostasis is achieved cover site with sterile gauze and sterile transparent semi-permeable dressing for at least 24 hours.
o. Inspect removed CVAD to ensure it is intact without defect, and measure and compare length to original.

DEFINITIONS

Central Venous Access Device (CVAD): A flexible catheter that is inserted under sterile conditions into a peripheral or central vein with the tip lying in the superior vena cava/right atrial junction or inferior vena cava (femoral insertion). Types include Non-Tunneled, Peripherally Inserted Central Catheters, Tunneled Central Venous Catheter, and Implanted Venous Access Ports. They may be used for introduction of intravenous fluids, total parenteral nutrition (TPN), medication, blood/blood products into the venous system, withdrawal of venous specimens, provide a site for central venous pressure monitoring.

Implanted Venous Access Port: The implanted port is surgically placed entirely under the skin. The catheter is inserted into the subclavian, internal jugular, external jugular, or cephalic vein and advanced until the tip is in the superior vena cava. The port is implanted in a subcutaneous pocket. The location can be identified by a small bulge in the skin. Access to the port is obtained by inserting a non-coring (Huber) needle through the skin and into the septum of the port. Surgical placement and removal is required. Suitable for long term or home therapy.

Non-Tunneled CVAD: A catheter that is percutaneously inserted into the subclavian or jugular vein and advanced until the tip is in the superior vena cava. If inserted in the femoral vein the optimal tip placement is in the inferior vena cava at the level of the diaphragm. May be single or multi-lumen. Insertion is usually done at the bedside in ED/OR/ICU. Removal by Registered Nurse with CVAD certification, knowledge, skill, and ability. Not suitable for long term or home therapy.

Peripherally Inserted Central Catheter (PICC): A small catheter inserted by venipuncture of the basilic, medial cubital, or cephalic vein at or above the antecubital space and advanced until the tip is positioned in the lower one third of the superior vena cava. May be single or multi-lumen. Tip may be valved, or open, valved catheters will have no clamps. Suitable for long term or home therapy. Insertion done under ultrasound. Removal by physician or CVAA Registered Nurse. *Do not use PICC arm for measuring blood pressure, peripheral IV sites, or venipuncture.

Tunneled Central Venous Catheter: Tip of the catheter is surgically placed via one of the large central veins into the superior vena cava; proximal end is tunneled subcutaneously for several centimeters to desired exit site. Have a cuff that helps to secure the catheter in the subcutaneous tunnel and prevents migration of bacteria along the outside of the catheter (i.e. Hickman, Broviac). Requires surgical placement and removal. Suitable for long term or home therapy.

LINKS TO REFERENCE

CKHA Central Venous Access Devices Learning Guide- located on iCKHA or reach out to PPT to obtain a copy.

Dynamic Health

REFERENCES

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Dynamic Health. (2024). *Central venous access device.* Retrieved from https://www.dynahealth.com/

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