Purpose

It is mandatory for all Registered Nurses (RNs) to be credentialed in the care and maintenance of CVADs.
Registered Practical Nurses (RPNs) may assist with portions of the shift assessments, such as: site assessment, ensuring the add-on devices are securely leur locked in place, and measuring the external length of the peripherally inserted central catheter (PICC).
All CVADs are the ultimate responsibility of RNs.

Scope

The policy pertains to all staff members and physicians at Muskoka Algonquin Healthcare (MAHC).

Policy Statement

RNs must be credentialed to provide care and ensure maintenance of all CVADs
The credentialing process has been met when the following standards have been completed:

- Attendance of a session of the Vascular Access Devices (VAD) training program, or review the self learning packages.
- Directly supervised by a credentialed RN when performing the skills associated with CVAD care and maintenance.
- Demonstrate clinically and have the knowledge, skill, judgement, and critical thinking abilities associated with CVAD therapy
- Demonstrated basic pump skills
- Must seek out an annual review of VADs, and document such.
- Have provided to the Clinical Educator the required credentialing and pump skills documents that indicate the standards have been met

Procedure

1. **Infusion Therapy Orders**
   - The purpose of the IV therapy should be identified with the most appropriate
     - type of IV therapy initiated. (e.g. PIV initiated if IV hydration therapy required,
     - CVAD if prolonged therapy or administering a vesicant/ irritating medication or
     - solution).
   - IV solution and specific rate must be ordered by the physician.
   - Must use an IV pump for all/ any infusions.
   - At minimum, a daily discussion related to the need for continuation of CVAD versus peripheral IV therapy.
   - Central venous access device therapy (e.g. peripherally inserted central catheter, PICC) should be considered if IV antibiotic therapy may be required for more than 7 days.

2. **Documentation** as per Central Venous Access Device (CVAD) Flowsheet

3. **Infection Prevention and Hand Hygiene**
   - Routine practice of hand hygiene is maintained at all times and practiced as per policy (e.g. before and after touching a patient, before handling an invasive device, before moving from a contaminated body site to another site, before & after donning sterile and procedure gloves).

- Any possible infected IV sites must be reported to the physician, charted on the Nurses Notes and a culture for C&S taken and sent to the laboratory. A memo must be sent to the Infection Control Manager and to the Unit Manager to allow for accurate follow-up.

4. **Care and Maintenance Assessment**
   - Initial CVAD placement must be verified by diagnostic imaging (e.g. X-ray) prior to infusing any type of solution or medication.
   - Any CVAD catheter tip placement must be documented by a physician. Most of the CVADs must have the catheter tip clearly seen within the superior vena cava (svc).
   - Typical CVAD catheters that must have their tip within the svc are:
   - percutaneous lines: jugular, subclavian
   - peripherally inserted central catheter (PICC)
   - tunnelled catheters: Hickman, Broviac
   - implanted device: PortaCath, VasPort

     - The exceptions are for the devices that have been inserted through a femoral access, which must have the catheter tip within the inferior vena cava (ivc), or an introducer sheath (cordis), which may not lie within the svc or ivc.
     - The cordis device has increased associated risks and should be removed as soon as possible if not being used for continuous IV therapy. If this device is being used, it should be restricted to CCU/ICU settings. This access device requires the flushing procedure every 12 hours if being used intermittently.

   - **Groshong valve** is a valve that is usually located at the tip of specially designed central catheters. This valve includes an in-line positive pressure device. The manufacturer recommends that an external positive pressure device is not used (e.g. CLC 2000), and that the catheter is not flushed with a heparin solution.

   - Peripherally inserted central catheters (PICC) require special attention related to placement verification.
   - The external length of a PICC must be measured every shift and prn, by RNs or RPNs. This involves measuring from the insertion site to the natural end of the catheter, which would be the location where additional tubings or positive pressure devices have been placed.
   - Refer to Procedures: CVAD Flowsheet: Tips, and CVAD Malposition
   - Implanted central catheters must be accessed using a non-coring safety engineered needle system that has been flushed with sterile normal saline prior to insertion.
   - Locating the implanted device requires light palpation surrounding the device, to identify the location of the device septum, which is the area that the non-coring safety engineered needle system will be inserted.
   - Refer to Procedure: Implanted Device
   - All clients with CVADs should be checked hourly from solution bag to IV site to ensure that:
     - IV pump is set accurately.
     - Rate of infusion is correct.
     - The tubing is not kinked, leaking, has air bubbles or blood present.
     - The site is comfortable with no signs of infiltration, phlebitis or leakage.
   - Vascular assessment should be completed every shift and prn. This assessment includes the 6 Ps: pain/discomfort, pallor, pulses, paraesthesia, paralysis, poikilothermia (cool to touch).
   - Continued need for therapy should be reviewed, at minimum, on a daily basis.

5. **CVAD Malposition**
   - Knowledge related to catheter tip placement must be documented in the admission history and/or in the Patient Care Record, as well as identified on the Kardex.
   - X-ray verification is required for catheter tip placement immediately following insertion to assess for malposition and with any subsequent concerns that may indicate secondary catheter malposition or migration.
   - Refer to Procedures: CVAD Malposition

6. **CVAD Migration**
   - May occur during changes in intrathoracic pressures (e.g. coughing, vomiting, suctioning), episodes of congestive heart failure, neck positioning, arm movements (eg abduction, flexion), positive pressure ventilation, high pressure injections as with some Diagnostic Imaging procedures, aggressive or inaccurate flushing techniques.
     - Identified as a catheter that lacks blood return, is difficult or is unable to be flushed, has a confirmed variance of 3cm or greater from the previous external length measurement, unusual shoulder or back or chest pain, and/or gurgle or sound of fluid heard on the same side catheter is located.
     - All IV therapy is to be held.
     - Notify physician.
     - X-ray is required to confirm catheter migration.
     - Physician order is required.

7. **Device Stabilization**
   - Is required to ensure the integrity of the access device, minimize catheter movement, and prevent catheter dislodgement.
   - For routine use, a transparent film dressing with sterile stabilization tapes (e.g. 3M Tegaderm IV Advanced, #1685) is required to allow visualization for assessment of the site.
   - For high risk patients, as those in CCU/ICU, dialysis and oncology, the CVAD dressing must be a transparent film dressing impregnated with chlorhexadine and sterile stabilization tapes (eg 3M- Tegaderm IV Advanced CHG, #1657R) to provide protection against catheter-related bloodstream infection (CRBSI), as well as allowing visualization for the assessment of the site.
   - All IVs (PIV and CVAD) are to have a transparent film covering up to the hub of the catheter, but not to include the entire leur lock aspect of the catheter.

8. **Tubing and add-on external devices**
     - An IV pump must be used for any/ all CVAD infusions, continuous and intermittent.

- IV pump blood tubings must be used for patients that are actively bleeding or a potential bleed, or undergoing a major surgical procedure, for patients in shock or severe trauma requiring rapid fluid replacement or transfusion.
- Soluset or Buretrol tubing set is required for all paediatric administration of IV solution and for drug administration.
- IV tubing must not be milked or squeezed.
- New IV tubing must be used when catheter changes occur
- Continuous usage IV tubing and all add-on devices (eg positive pressure devise) are changed every 72 hours
- Intermittent usage IV tubing, TPN tubing and all add-on devices are to be changed every 24 hours
- Blood & blood product tubing(s), including filters, must be specifically for blood & blood products, and must be changed every 4 hours
- All IV tubings must be labelled with the date & time hung.

9. **Solution**
   - IV Solution bags must be checked prior to use:
   - Outer wrapper should be intact and not be removed until the solution is to be used.
     - If the outer wrapper has been removed and solution is not used, it must be returned to Pharmacy, not to the IV storage area.
     - Check for fluid between outer wrapper and bag - if there is any, return to Pharmacy.
     - Check date and clarity of solution - if either in doubt return to Pharmacy.
     - Check IV solution bag for leaks.
     - If white tab breaks off during preparation - do not use and return to Pharmacy
   - Proper size of IV solution bag must be selected in accordance with therapy ordered:
     - TKVO equals Saline Lock
       - Refer to Procedures: Flushing and Locking
     - If the rate has been ordered as greater than 100 mL./hr, use 1000 mL.bag
   - No one IV solution is to hang longer than 24 hours.
   - All patients being transferred from one area to another should have charted the amount of solution absorbed and the amount to be absorbed. The unit receiving the patient should double check this for accuracy and chart accordingly.
   - Total IV volumes absorbed per shift are to be listed on Patient Profile sheet.
   - Each solution must be listed and these totals added into the patient's total intake for each shift.
   - IV solution, type, rate of flow, amount remaining and IV insertion site on each patient must be checked both on coming and off going nurses at the beginning of each shift.
     - Vesciant/ irritating medications (eg chemotherapy and inotropes),hypertonic solutions (eg Total Parenteral Nutrition (TPN)) must be infused through a CVAD.

- Prior to transferring from CCU/ICU, subclavian and jugular access devices should be removed and with an appropriate replacement (eg PICC, PIV) inserted prior to transferring the patient to the Medical Surgical Unit(s).
- Subclavian and jugular access devices should be limited to CCU/ICU, OR or ED settings due to the increase risks associated with these catheters.

10. **Site Care and Dressing**
    - Chlorhexadine 2% (without alcohol) must be used to cleanse the site during dressing changes. Alcohol may cause damages to the integrity of catheter
    - Must cleanse the leur lock access site with a chlorhexadine 0.5% & alcohol 70% swab each time the VAD is accessed. (eg Clave port on tubings, add on devices such as positive pressure device, vacutainer for blood sampling, syringes etc).
    - All IV dressings must be labelled with the date of initiation.
    - Dressings are changed weekly and prn.
    - Refer to Policy: Assessment and Device Stabilization, and Procedure

11. **Flushing and Locking**
    - CVAD must be flushed prior to and after each infusion, following the Flushing and Locking Procedure.
    - Initial placement verification must be done by an Xray, which is assessed and documented by a physician with all CVADs prior to initial use.
    - Secondary placement verification must be done prior to each use, by attaching a 10mL or greater sterile normal saline filled syringe, gently withdraw blood tinged fluid to verify placement.
    - Refer to Procedure: Flushing and Locking
    - All unused ports must be locked with saline if being intermittently used, or heparinized if not being used.
    - Refer to Procedure: Flushing and Locking

12. **Occluded catheter and/or port(s)**
    - Consult with Oncology Unit RNs or Clinical Educator.
    - Oncology Unit RNs or the Clinical Educator RN are credentialed to initiate the appropriate protocol.

13. **Discontinuation of CVAD Therapy**
    - Must be performed by a physician.
    - Close cardiovascular & respiratory assessments should be implemented following the CVAD due to potential associated risks.
    - Refer to Policy: Infection Prevention and Hand Hygiene

Dressings
- Changed weekly and prn
- Must use sterile technique

Equipment

- sterile gloves
- sterile tray or sterile suture removal kit
- 4 chlorhexadine 2% swabs (without alcohol)
- appropriate Tegaderm IV Advanced (#1685 or #1657R) dressing
- appropriate tape to secure the tubing to the patient

Procedure

1. Perform hand hygiene.
2. Chlorhexadine 2% swabs for cleansing in a circular pattern
    - 1 counterclockwise & 1 clockwise (or viceversa)
    - last swab from insertion site towards hub of catheter
3. Allow to air dry.
4. Transparent film securement dressing (eg Tegaderm IV Advanced - #1685 or #1657R) must be applied, including the date & time label:
    a) for winged catheters
        - cut one of the sterile securement tapes in half
        - apply the first half of the sterile securement tape vertically across one of the catheter wings
        - apply the last half of the sterile securement tape vertically across the other catheter wing
        - apply the second sterile securement tape horizontally across the catheter wings to overlap the vertical securement tapes
        - apply the transparent film dressing, securing the bottom edges under the hub portion of the catheter but not over the hub leur lock portion
    b) for non-winged catheters
        - apply the first sterile securement tape horizontally across the top portion of the catheter hub, near the insertion site but not to occlude the insertion site
        - apply the second sterile securement tape horizontally across the middle portion of the catheter hub but not over the hub leur lock portion
        - apply the transparent film dressing, securing the bottom edges under the hub portion of the catheter but not over the hub leur lock portion
5. Apply the completed date label.
6. Identify if during or after the procedure the patient experienced any discomfort or pain.
7. Assess the IV site for erythema (redness), induration (hard texture) and edema, as well complete a vascular assessment. Refer to Policy: Assessment and Documentation Tool
8. Discard the equipment in the appropriate manner.
9. Remove gloves and complete hand hygiene.
10. Documentation. Refer to Policy: Documentation

Flushing and Locking

To identify the presence of a Groshong valve:

- Noted on the patient's documents (eg wallet card with insertion information, Kardex, CVAD Flowsheet)
- Assess catheter by:

Equipment

- chlorhexadine/alcohol swabs
- 10mL syringe with sterile normal saline
- VSAS or VSASH as indicated

Procedure

1. Perform hand hygiene.
2. Cleanse the catheter Clave port with chlorhexadine/alcohol swab.
3. Leur lock a 10mL syringe of sterile normal saline onto the port.
4. Gently withdraw to verify line placement.
5. If resistance is noted at 2mL, pause then resume by gentle aspirating to verify line placement and to identify if Groshong valve present.
6. Groshong valve is present if resistance is noted at approximately every 2mLs instilled.
7. Continue with Flushing and Locking procedure as indicated.
8. Assess the IV site for erythema (redness), induration (hard texture) and edema, as well complete a vascular assessment. Refer to Policy: Assessment and Documentation Tool
9. Discard the equipment in the appropriate manner.
10. Remove gloves and complete hand hygiene.
11. Document "Groshong valve" on Kardex. Refer to Policy: Documentation

Positive pressure device (eg CLC 2000, PosiFlow)

- Must be used with all CVADs, exception is the Groshong valve catheters
  - Refer to Policy: Assessment
- Ensures positive pressure within the catheter, preventing the reflux of
  - blood into the catheter tip.
- Must ensure that the leur lock connection is secure.
- Do not clamp using the in-line catheter clamp as this removes the intracatheter positive pressure.

Equipment

- 10mL syringe of sterile normal saline
- positive pressure device
- chlorhexadine/alcohol swabs
- equipment required for VSAS or VSASH technique

Procedure

1. Perform hand hygiene.
2. Cleanse the positive pressure device leur lock port with a chlorhexadine/alcohol swabs.
3. Leur lock the sterile normal saline syringe onto the positive pressure device and flush the device.
4. If attaching directly to the central catheter, ensure the catheter in-line is clamped, using sterile technique attach the positive pressure device by securely leur locking it in place.
5. If there is an existing Clave port on the central catheter, cleanse this port with a chlorhexadine/alcohol swab, attach the positive pressure device by securely leur locking it in place and ensure the catheter in-line clamp remains unclamped.
6. Follow the appropriate Flushing and Locking procedure (VSAS or VSASH).
7. Discard the equipment in the appropriate manner.

8. Remove gloves and complete hand hygiene.

Push- Pause technique

- This will create intraluminal fluid turbulence while flushing the catheter.
- Must be performed with sterile normal saline, and when indicated with heparin solutions.

Equipment

- 10mL syringe with sterile normal saline
- chlorhexadine/alcohol swabs
- required additive (eg IV antibiotic)
- heparin solution if indicated

Procedure

1. Perform hand hygiene.
2. Gently push 0.5 to 1mL of solution, pause, and repeat the sequence until the solution has been instilled.
3. Assess the IV site for erythema (redness), induration (hard texture) and edema, as well complete a vascular assessment. Refer to Policy: Assessment and Documentation Tool
4. Discard the equipment in the appropriate manner.
5. Remove gloves and complete hand hygiene.
6. Complete hand hygiene.
7. Document. Refer to Policy: Documentation

VSAS and VSASH techniques

- Must always use a 10mL syringe or larger volume syringe.
    - Smaller barrelled syringes yield a higher pounds per square inch (psi) that can damage the catheter.
- All CVADs must have positive pressure device (CLC 2000) on all intermittently accessed ports. The positive pressure device must be leur locked securely with the in-line catheter clamp open; exception is the Groshong valve catheter.
- The in-line catheter clamp must be clamped when removing the positive pressure device, or any other device, and when changing the tubing.
- Gently infuse solutions using a push pause technique
- Assess the IV site for erythema (redness), induration (hard texture) and edema, as well complete a vascular assessment. Refer to Policy: Assessment and Documentation Tool

VSAS

V- **V**erify the catheter placement by gently withdrawing until blood tinged fluid appears
S- gently infuse 10mL sterile normal **S**aline
A- **A**dd the intermittent therapy or obtain blood samples
S- gently infuse 10mL sterile normal **S**aline orgently infuse 20mL sterile normal saline post blood sampling or TPN

VSASH

V- **V**erify the catheter placement by gently withdrawing until blood tinged fluid appears

S- gently infuse 10mL sterile normal **S**aline
A- **A**dd the intermittent therapy or obtain blood samples
S- gently infuse 10mL sterile normal **S**aline or gently infuse 20mL saline post blood sampling or TPN
H- gently infuse 3mL **H**eparin solution in a 10mL syringe (concentration: 100units unfractionated heparin in 1mL sterile normal saline)

Blood sampling via Central Venous Access Device (CVAD)

Equipment

- chlorhexadine/alcohol swabs
- blood specimen vacutainer
- blood specimen tubes according to tests ordered
- 3- 10mL syringes with 10mL sterile normal saline
- if indicated 10mL syringe with 3mL heparin solution

Procedure

1. Perform hand hygiene.
2. Assemble equipment.
3. Cleanse the Clave or the positive pressure device (CLC 2000) leur lock port of CVAD.
    - using one chlorhexadine/alcohol swab clockwise
    - using a second chlorhexadine/alchol swab counter clockwise
4. Leur lock the 10mL sterile normal saline syringe onto the port.
5. Verify patency of the CVAD by gently withdraw the syringe plunger until blood tinged fluid is noted.
6. Using a gentle "push-pause" technique, instill the sterile normal saline.
7. Remove the syringe.
8. Cleanse the port with a chlorhexadine/alcohol swab.
9. Leur lock the blood specimen vacutainer onto this port.
10. Insert the blood tube identified as "waste" or "discard" specimen, obtain blood specimen. Must have a minimum of 5 mL waste to ensure accuracy of blood results.
11. Insert the remaining tube(s) as indicated by the blood tests ordered, and obtain blood specimen(s).
12. Remove the blood specimen vacutainer, ensuring that the positive pressure device remains securely luer locked to the CVAD.
13. Cleanse the port with a chlorhexadine/alcohol swab.
14. Luer lock the second sterile normal saline syringe onto this port.
15. Using a gentle "push-pause" technique, instill the sterile normal saline.
16. Remove the syringe.
17. Repeat steps 13 to 16.
18. If this port is to remain in use, re-assess the site, ensure the leur lock connections are secure, and complete the required documentation. If this port is not scheduled to be used, follow the heparin aspect of VSASH, followed by re-assess the site, ensure the leur lock connections are secure, and complete the required documentation.

19. Assess the IV site for erythema (redness), induration (hard texture) and edema, as well complete a vascular assessment. Refer to Policy: Assessment and Documentation Tool
20. Discard the equipment in the appropriate manner.
21. Complete hand hygiene.

CVAD Malposition or Migration

- Xray verification is required for catheter tip placement immediately following insertion, prior to IV therapy being initiated
- Placement is to be confirmed and documented by a physician

Equipment

- measuring tape
- Xray if indicated, requires a physician order

Procedure

1. Measure the external length of the catheter. Refer to: CVAD Flowsheet- Tips
2. Assess patient situation related to the following and provide appropriate interventions:
    - changes in intrathoracic pressures (eg coughing, vomiting, suctioning)
    - episodes of congestive heart failure
    - neck positioning
    - arm movements (eg abduction, flexion)
    - positive pressure ventilation
    - high pressure injections as with some Diagnostic Imaging procedures
    - aggressive or inaccurate flushing techniques
3. Notify physician.
4. X-ray is required for a confirmed catheter migration.
5. Physician order is required.

Implanted Device Accessing

Equipment

- non-coring safety engineered needle system (needle with attached extension tubing)
- sterile gloves
- sterile tray or sterile suture removal kit
- 2- 10mL syringes with normal sterile saline
- appropriate Tegaderm IV Advanced (#1685 or #1657R) dressing
- appropriate tape to secure the tubing to the patient

Procedure

1. Perform hand hygiene.
2. Prepare the non-coring needle system using sterile technique:
    - Attach one 10mL sterile normal saline syringe to the hub of the extension tubing and instill the solution until it flows freely through non-coring needle.
    - Place the flushed system in a sterile manner (eg within the sterile package).

3. Lightly palpate the area surrounding the implanted device to locate the edges of the device; approximate the center of the implanted device.
4. Cleanse in a circular pattern the area surrounding and including the approximated center of the implanted device using a chlorhexadine 0.5% with alcohol 70% swab.
5. Allow to air dry.
6. Don gloves.
7. Gently but firmly insert the non-coring needle system into the identified center of the implanted device. If a removable gripper is part of the system, this can be removed to allow the site dressing to lay closer to the skin surface.
8. Apply a transparent film securement dressing (eg Tegaderm IV Advanced- #1685 or #1657R), including the date & time label:
    - cut one securement tape in half
    - apply half of the first sterile securement tape vertically across one wing of the system
    - apply the remaining half of the first sterile securement tape vertically across one wing of the system
    - apply the second sterile securement tape horizontally across the catheter wings to overlap the vertical securement tapes
    - apply the transparent film dressing over the insertion site and wings, securing edges up to the hub portion of the extension tubing, but not over the hub
9. Identify if during or after the procedure the patient experienced any discomfort or pain.
10. Assess the IV site for erythema (redness), induration (hard texture) and edema, as well complete a vascular assessment. Refer to Policy: Assessment and Documentation Tool
11. Discard the equipment in the appropriate manner.
12. Remove gloves and complete hand hygiene.
13. Documentation. Refer to Policy: Documentation

De-accessing

Equipment
- sterile gloves
- VSASH equipment
- bandaid

Procedure
1. Perform hand hygiene.
2. Follow the VSASH technique.
3. Clamp the in-line tubing clamp.
4. Don gloves.
5. Gently and firmly remove the non-coring needle system, ensuring that the safety device has been activated (eg needle is secured within base of needle system or protective guards have enclosed needle).
6. A simple dressing can be applied (eg bandaid).
7. Identify if during or after the procedure the patient experienced any discomfort or pain.

8. Assess the IV site for erythema (redness), induration (hard texture) and edema, as well complete a vascular assessment. Refer to Policy: Assessment and Documentation Tool
9. Discard the equipment in the appropriate manner.
10. Remove gloves and complete hand hygiene.
11. Documentation. Refer to Policy: Documentation

Cross Reference

Notes

A printed copy of this document may not reflect current, electronic version on the Medworxx website. Any copies of this document appearing in paper form should always be checked against electronic version prior to use.

References / Relevant Legislation

Journal of Infusion Nursing; Infusion Nursing Standards of practice (2011) Lippincott, Williams & Wilkins; includes 2011 INS and CDC standards

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