The provision of central venous access device (CVAD) care by Licensed Practical Nurses (LPNs) on the Pediatric Medical Unit (PMU) and by Registered Nurses is a Beyond Entry Level Competency (BELC) that may only be performed by nurses that have met the requirements for initial and ongoing certification.

The administration of a de-clotting agent to a totally blocked line is a BELC that may only be performed by the CVAD nurse and select RNs from Hematology/Oncology that have met the requirements for initial and ongoing certification.

POLICY

This policy will provide consistent guidance for safe and competent practice in the care of patients who experience a Central Venous Access Device (CVAD) occlusion. This policy will also guide utilization of the most appropriate de-clotting agent for clearing the CVAD occlusion when a CVAD competent nurse and/or physician identifies it is required.

This policy is the responsibility of the IWK Pharmacy department and the Central Venous Access (CVA) Service. This policy does not apply to peritoneal dialysis catheters.

An order from an authorized prescriber is required for the administration of a de-clotting agent. This policy addresses fibrin and chemical causes of occlusion. For mechanical occlusions see Clinical Policy 740 - CVAD Complications and their Management.
GUIDING PRINCIPLES AND VALUES

Catheter occlusion is a significant complication because infusion therapy may be delayed or interrupted. If catheter occlusions can be successfully treated then the cost and trauma of replacement can be avoided. The best management in preventing catheter occlusions is through safe and competent nursing practice in catheter care.

PROTOCOL

The accompanying pre-printed order sheet (IWKCVADUN) is to be used for suspected fibrin catheter occlusion following completion by an authorized prescriber prior to administration of the drug.

Assessment

The Nurse assesses for mechanical causes of occlusion. Once a mechanical cause (ex. line clamped) is ruled out, the Nurse consults the appropriate authorized prescriber and/or the CVA Nurse. The CVA Nurse is available for consultation at any stage of this process (pager #1759). See Appendix A for definitions on types of occlusions.

For Suspected Fibrin Occlusions:

Alteplase

Preparation: As per manufacturer’s recommendation

Patients weighing less than 5 kg, consider hematology consult.

Patients WEIGHING 5 kg - less than 30 kg; see table below:

<table>
<thead>
<tr>
<th>Catheter Type</th>
<th>Alteplase dose (per lumen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICC</td>
<td>1 mg</td>
</tr>
<tr>
<td>Non-tunneled (cook/arrow)</td>
<td>0.5 mg</td>
</tr>
<tr>
<td>Implanted (Port-a-cath)</td>
<td>2 mg</td>
</tr>
<tr>
<td>Tunneled (broviac/hickman)</td>
<td>1 mg</td>
</tr>
</tbody>
</table>

Patients WEIGHING 30 KG OR GREATER, use 2 mg.

The accompanying pre-printed order sheet (IWKCVADUN) for alteplase is to be completed by an authorized prescriber prior to administration of the drug

For Suspected Chemical Occlusions (See Appendix B):
Hydrochloric Acid 0.1N (HCl)

Prepared by IWK Pharmacy and kept in stock. Contact Pharmacy. Use for acidic drugs (see Appendix B) or calcium-phosphate precipitate (from TPN) See Table 2 for appropriate volume Dwell time: 60 minutes, check and repeat dose for another 60 minutes if necessary

Sodium Bicarbonate (NaHCO₃)

Use commercially prepared product – Sodium Bicarbonate Inj. 1mEq/mL (8.4%), available on most nursing units in 50 mL vials. Use for alkaline (basic) drugs: See Appendix B See Table 2 for appropriate volume Dwell time: 60 minutes, check and repeat dose for another 60 minutes if necessary

Table 2-Volume of Unblocking Agent

<table>
<thead>
<tr>
<th>Catheter type</th>
<th>Unblocking Agent</th>
<th>HCl 0.1N</th>
<th>NaHCO₃ or NaOH</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICC</td>
<td>Volume of agent required (mL)</td>
<td>1 mL</td>
<td>1 mL</td>
</tr>
<tr>
<td>Implanted (Port-a-Cath)</td>
<td></td>
<td>1.5 mL</td>
<td>1.5 mL</td>
</tr>
<tr>
<td>Non-Tunneled (Cook, Arrow)</td>
<td></td>
<td>1 mL</td>
<td>1 mL</td>
</tr>
<tr>
<td>Tunneled (Broviac, Hickman)</td>
<td></td>
<td>1 mL</td>
<td>1 mL</td>
</tr>
</tbody>
</table>
PROCEDURE

Instillation Procedure for a Partially Blocked CVAD

May only be performed by a Registered Nurse who has demonstrated competence and is certified for the procedure.

This procedure is to be used when a CVAD can be instilled directly with fluid.

1. Set aside the following materials
   - 2 x 10 mL luer lock syringe
   - Blunt canula
   - Antiseptic swabs
   - 3 x 10 mL 0.9% NaCl prefilled syringes
   - Declotting agent supplied by pharmacy
   - Medication label
   - Sterile water – 10 mL
   - Needless connector if needed
   - Heparin, appropriate strength for treatment or ordered IV solution

2. Explain procedure to patient.
3. Perform hand hygiene.
4. Reconstitute de-clotting agent if applicable and withdraw desired dose into syringe.
5. Disinfect the end cap per Policy 735 V
6. Maintaining aseptic technique, attach prefilled 10 mL 0.9% NaCl syringe, unclamp and check for blood return. If blood return is present, no additional actions required at this time. If no blood return, flush with 10 mL 9% NaCl, noting resistance to flush. Clamp.
   **Note: Alteplase is not compatible with Heparin.**
7. Remove 0.9% NaCl syringe, clean end cap with approved antiseptic swab and attach syringe containing appropriate catheter clearing agent.
8. Unclamp and slowly instill the ordered catheter clearing agent.
9. Clamp catheter and place a medication label on the catheter, stating, "De-clotting agent in place. DO NO USE."
10. Leave alteplase in place for 30-120 minutes; all other de-clotting agents for 60 minutes.

Evaluating Patency

1. Perform hand hygiene
3. Clean end cap as per policy 735.
4. Maintaining aseptic technique, attach empty 10 mL syringe, unclamp and attempt to aspirate.
5. For Alteplase catheter clearing agent
   a. If able to aspirate blood EASILY, withdraw the amount of catheter clearing agent previously instilled plus 2 mL. Clamp. Remove syringe, and attach saline syringe/s, disinfecting end cap before each connection. Flush with 20 mL of saline using turbulent technique. Proceed with planned treatment.
b. If **unable to aspirate** blood or **resistance** is experienced, reinstall original dose and allow drug to dwell for an additional 90 mins (total dwell time of 120 mins).

c. Recheck at end of 120 mins,
   i. If you are able to aspirate blood easily, proceed as outlined in 5 a above
   ii. If you are still **unable to aspirate** blood, consult with authorized prescriber to see if a second dose is to be administered.

6. For all other de-clotting agents.
   a. If able to aspirate blood **EASILY** after 60 minutes, withdraw the amount of catheter clearing agent previously instilled plus 2 mL. Clamp. Remove syringe, and attach saline syringe/s, disinfecting end cap before each connection. Flush with 20 mL of saline using turbulent technique. Proceed with planned treatment.
   b. If unable to aspirate blood, instill a second amount and leave in place for an additional 60 minutes.
   c. If you are still unable to aspirate blood, clamp and contact physician.

7. Document the procedure, including the type and amount of de-clotting agent used, dwell-time(s), number of lumens, outcome of the procedure, patient teaching, and how patient tolerated the procedure.

No more than 2 doses of de-clotting agent should be administered in a 24-hour period.

**Instillation Procedure for a Totally Blocked CVAD**

**Certification for this skill is currently held by the CVAD nurse and select nurses in Hematology/Oncology.**

Standard Protocol for Treating Incomplete or Withdrawal Occlusions in Central Venous Access Devices

This procedure is to be used when the CVAD cannot be instilled directly with fluid. If you are able to introduce at least 2 mL of fluid from a syringe into the line, use the standard protocol.

1. Set aside the following materials
   - 3 x 10 mL Luer lock syringe, Health Centre approved antiseptic swabs
   - 2 x 10 mL 0.9% NaCl prefilled syringes
   - 10-12 mL syringe filled with appropriate amount and type of locking solution
   - Needless connector, if needed.
   - De-clotting agent supplied by pharmacy
   - Medication label
   - Sterile water – 10 mL
   - Sterile three-way stopcock

2. Explain the procedure to patient.
3. Perform hand hygiene.
4. Reconstitute de-clotting agent if applicable (see above) and aspirate into 10 mL syringe.
5. Instill de-clotting agent in the line using the following procedure.
Using negative pressure to instill de-clotting agent into a fully blocked line:

1. Clamp central line.
2. Remove end cap if needed (additional sterile gauze, mask, sterile gloves and sterile tray/towel will be needed i.e. occluded PICC) and attach the Luer lock end of the three-way stopcock to the catheter, making sure the stopcock is in the OFF position.
3. Attach the syringe containing the de-clotting agent to one of the ports on the stopcock.
4. Prime the 3 way stop cock with the drug.
5. Attach the empty 10 mL syringe to the remaining port on the stopcock.
6. Turn the stopcock OFF to the syringe containing the drug.
7. Gently aspirate the catheter until the plunger of the 10 mL syringe is pulled back to the 3-5 mL mark. Clamp while maintaining negative pressure.
8. Turn the stopcock OFF to the aspirated syringe.
9. Unclamp the catheter and turn stopcock to allow the de-clotting agent to be drawn into the central line.
10. The syringes will need to be pulled back several times to allow full installation of the drug.
11. Once the de-clotting agent is drawn into the catheter, turn the stopcock to close the flow. Clamp catheter and attach a new end cap.
12. Place a medication label on the catheter, stating, “De-clotting agent in place. DO NOT USE.” Allow alteplase to dwell in the catheter for 30 to 120 minutes before checking CVAD patency. For all other agents check after 60 minutes. Note that the probability of success is decreased with a shorter dwell time. Proceed with all remaining steps in the standard procedure following “Evaluating Patency.”
13. Repeat instillations can be carried out using the stopcock procedure described above. If the CVAD remains partially occluded but can now be instilled directly using a syringe, it is not necessary to use the stopcock method.

Documentation

The Nurse documents the CVAD occlusion assessment and the administration of the de-clotting agent on the Central Venous Access Flow Sheet—form ID IWKCEVEAC.
REFERENCES


RELATED DOCUMENTS

Policies
Clinical Policy 740 – CVAD: Complications and their Management
Administrative Policy 324.0B - Beyond Entry Level Competencies (BELCs): Performance of Beyond Entry Level Competencies (BELCs) by Nurses at the IWK Health Centre
Administrative Policy 301.1 – Adverse Event and Good Catch (Near Miss) Reporting

Forms
Preprinted order - Unblocking of Occlusions Form ID IWKCVADUN
Central Venous Access Flow Sheet –Form ID IWKCEVEAC.

Appendices
Appendix A- Definitions
Appendix B- Chemical Occlusions
APPENDIX A

Definitions

**Catheter occlusion**: partial or complete obstruction of the CVAD that limits or prevents the ability to withdraw blood, flush the catheter or administer parenteral solutions and/or medications.

**Fibrin related occlusion**: deposits of fibrin and blood components within and around the CVAD slow or stop flow through the catheter.

**Non-fibrin occlusion**: may be the result of mechanical causes; drug or mineral precipitates or lipid residue (chemical).

**Total (complete) occlusion**: the inability to infuse into or withdraw blood from the CVAD.

**Partial occlusion**: occurs when there is resistance with flushing and aspiration and/or sluggish flow through the catheter.

**Withdrawal occlusion**: A withdrawal occlusion is the inability to aspirate blood but able to infuse without any resistance.

**External/Mechanical Occlusions** are occlusions that occur to the exposed catheter. Examples include:
- empty IV bag
- closed clamp
- kinked or twisted catheter line
- pressure on line due to dressing
- external fracture of catheter
# APPENDIX B

## Chemical Occlusions

### Table 1 – Choosing the Appropriate Agent

<table>
<thead>
<tr>
<th>Agent</th>
<th>Use for</th>
<th>Mechanism of action</th>
<th>Adverse reactions</th>
<th>Warnings, comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alteplase (Cathflo®)</td>
<td>Fibrin Occlusions</td>
<td>Alteplase catalyses the conversion of plasminogen to plasmin and initiates fibrinolysis</td>
<td>Little experience in neonates</td>
<td></td>
</tr>
<tr>
<td>Hydrochloric acid&lt;sub&gt;pH 0.1N&lt;/sub&gt;</td>
<td>Drug precipitate or mineral e.g. calcium-phosphorous</td>
<td>1. Drugs with a low pH that may have precipitated are returned to solution by decreasing the pH e.g. vancomycin, 2. Calcium-phosphorous precipitate from TPN</td>
<td>Metabolic acidosis unlikely with small volumes used if accidentally flushed; preferable to aspirate</td>
<td>Some concern about damage to the wall of the catheter (may be reduced with shorter dwell time)</td>
</tr>
<tr>
<td>Sodium bicarbonate 1 mEq/mL (8.4%)</td>
<td>Drug precipitate</td>
<td>Drugs with a high pH that may have precipitated are returned to solution by increasing the pH e.g. phenyTOIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium Hydroxide (NaOH) 0.1N</td>
<td>Drug precipitate or lipid deposits</td>
<td>1. Dissolves lipid residue in polyurethane catheters 2. Drugs with a high pH that may have precipitated are returned to solution by increasing the pH e.g. phenyTOIN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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* * *

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OP3PO150710
IWK Policies Being Replaced

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Version History

<table>
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<tr>
<th>Major Revisions (e.g. Standard 4 year review)</th>
<th>Minor Revisions (e.g. spelling correction, wording changes, etc.)</th>
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