Purpose

To provide standards for managing occlusions / obstructions in Central Vascular Access Devices (CVADs). This includes short term central venous catheters, tunneled central venous catheters, peripherally inserted central venous catheters (PICC) and implanted vascular access devices (IVAD): Occlusions/ obstructions include:

- complete occlusion (cannot be flushed or aspirated)
- withdrawal occlusion (can be flushed but not aspirated)
- sluggish catheter (increased resistance to flushing)

Policy Statement

At Covenant Health facilities, a patient care order by an authorized prescriber is required to administer a catheter clearance agent.

Outpatients sent home with a catheter clearance agent instilled shall receive appropriate instruction, and an appointment made for them to return to have a health care professional remove the catheter clearance agent and assess for restoration of patency.

Should catheter clearance agent not restore patency, the most responsible health practitioner must be notified and consideration given to removal of the device.

Applicability

This policy and procedure applies to all Covenant Health facilities, staff, members of the medical staff, students and any other persons acting on behalf of Covenant Health.

Responsibility

The health care professional who instills the agent is responsible to demonstrate compliance with the requirements identified in this policy and procedure and to also shall provide the patient, family/caregiver, or legally authorized representative with information about safe behaviours and mandatory restrictions regarding the use of the affected catheter lumen.

Principles

CVAD occlusion is a significant complication because it can result in disruption of therapy and puts the patient at risk for such complications as infection, thromboembolism or proliferation of the clot resulting in a major venous thrombosis. In many situations catheter occlusions can be resolved, avoiding the trauma and cost of catheter removal and replacement. The desired clinical goals are positive patient outcomes as evidenced by restoration of catheter patency, absence of complications and patient satisfaction.

Standard infection control practices, hand hygiene standards, and strict aseptic technique are to be maintained throughout the procedure.

Education Requirement

Occlusion management of a CVAD is a Specialized Clinical Competency and may only be performed by a health professional with demonstrated competency in this procedure:
# Occlusion Management of Central Venous Catheters in Adult Patients

**Date Effective**
Sept. 15, 2017

**Policy No.**
VII-B-335

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## Procedure

See Attached

## Definitions

**Most responsible health practitioner** means the health practitioner who has responsibility and accountability for the specific treatment/procedure(s) provided to a patient and who is authorized by Covenant Health to perform the duties required to fulfill the delivery of such a treatment/procedure(s) within the scope of his/her practice.

**Authorized Prescriber** means a health care professional who is permitted to prescribe medications as defined by Federal and Provincial legislation, her/his regulatory college, Covenant Health, and practice setting (where applicable).

**Health care professional** means an individual who is a member of a regulated health discipline, as defined by the *Health Disciplines Act* or the *Health Professions Act*, and who practices within scope or role.

## Related Documents

- [eCFS monograph](http://www.e-therapeutics.ca/cps.showPrintableMonograph.action?monographId=m111500)
- Occlusion Management Learning Module (PowerPoint)
- Occlusion Management Performance Checklists and Test

## References


## Revisions

- February 10, 2017
- October 11, 2013
## PROCEDURE

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POINTS OF EMPHASIS

Assessment:
1. Prior to initiating CVAD occlusion management the health care professional must:
   - confirm that an occlusion exists and the most likely cause.
   - review the patient’s physical status, allergies, any other contraindications and/or precautions to using the chosen catheter clearance agent.

2. If symptoms suggest a CVAD may be malpositioned, kinked or broken radiographic studies must be undertaken prior to instilling a catheter clearance agent.

3. Occlusions in any central venous catheter, including direct percutaneous short term CVAD’s catheters should be managed or the catheter removed. Do NOT label catheter blocked/occluded as blood clots within the lumen of the catheter contribute to catheter-related blood stream infections. Catheter may be labeled over the weekend until staff qualified to restore patency are available.

4. Review catheter use to determine the appropriate catheter clearance agent. Consider if catheter used for incompatible drugs, or drugs known to precipitate (e.g. Phenytoin). If drug precipitate suspected and pH unknown, consult Vascular Access Team, pharmacy, or most responsible health practitioner to determine appropriate clearance agent or next steps.

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<td>1st dose</td>
<td>30 minutes</td>
<td>50-60%</td>
</tr>
<tr>
<td></td>
<td>120 minutes</td>
<td>74%</td>
</tr>
<tr>
<td>2nd dose</td>
<td>20 minutes</td>
<td>87-90%</td>
</tr>
<tr>
<td></td>
<td>120 minutes</td>
<td>93%</td>
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Instillation and Aspiration of Catheter Clearance Agents
1. Catheter lumens must be labelled with type of catheter clearance agent insitu.

2. After appropriate dwell time, the catheter clearance agent will be aspirated and discarded.

Instillation, Aspiration, and Flushing Pressures
1. Instillation, aspiration, and flushing of vascular access devices must be performed using a method that is within the catheter manufacturer’s maximum pressure limits in pounds per square inch (PSI).

Documentation
1. Documentation in the patient’s permanent health record must contain complete and accurate information pertaining to all aspects of the catheter clearance procedure including education provided.
Post Occlusion Management Follow-Up
1. Following CVAD occlusion management, the health care professional shall:
   - Assist health professionals with problem solving any adverse events resulting from catheter occlusion management procedure.
   - Ensure that the attending physician or other authorized health professional, who ordered the occlusion management of the catheter, is aware of any adverse events.

Competency
1. Prior to undertaking occlusion management of a CVAD the health professional must demonstrate competency.

Scrub the hub: Each time the injection cap is entered it must be cleaned with an alcohol or chlorhexidine/alcohol wipe. Scrub the injection cap with the wipe for 15 seconds using friction and allow the solution to dry.
There are three possible techniques for instillation of catheter clearance agents:

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<td>Complete occlusion when catheter clearance agent is supplied in syringe smaller than 10mL</td>
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**PROCEDURE 1**

**DIRECT INSTILLATION TECHNIQUE**

**INDICATION**

- This technique may be used for a withdrawal occlusion or sluggish catheter

**EQUIPMENT**

- Low level disinfectant for cleaning work surface
- Antiseptic swab(s)
- 10 mL syringe filled with appropriate catheter clearance agent, as ordered
- 10 mL syringe
- 10 mL pre-filled normal saline syringe (3)
- Heparin/Sodium Citrate solution, as required to lock post procedure
- Non-coring needle primed with catheter clearance agent, as required for implanted port/IVAD
- Medication label

**PROCEDURE**

1. Prepare catheter clearance agent, as required. Use filter needle to draw up Alteplase.
2. Explain the procedure, including possible adverse effects of the catheter clearance agent.
3. Obtain baseline vital signs (temperature, blood pressure, respirations and pulse).
4. Clean the work surface with an appropriate disinfectant. Allow to dry.
5. Perform hand hygiene. Apply protective gloves.
6. **Scrub the hub.**
7. Flush catheter well with 10 mL of normal saline using brisk push/pause method.

8. Attach syringe with catheter clearance agent.

9. Instill catheter clearance agent. Split the dose between the number of lumens that are occluded.

10. Clamp catheter, if required.

11. Label the lumen with a “Medication Added” label with the following:
   - DO NOT USE
   - medication
   - date
   - time
   - signature

12. Document in patient’s health record:
   - education
   - baseline vital signs
   - catheter clearance agent instilled
   - lumens instilled
   - do not use labeled lumen
   - dwell time required

13. If called to another unit to clear catheter: report to staff. Tell them not to use catheter and when you will return to aspirate clearance agent.

14. Allow catheter clearance agent to dwell in catheter for appropriate amount of time.

15. Repeat vital signs, as necessary.

16. After appropriate dwell time, remove label, scrub the hub and attempt to aspirate.

17. If blood return noted, aspirate and discard 4-5 mL of blood for adults.

18. Flush catheter well with at least 20 mL of normal saline using brisk push/pause method. If unable to clear needleless connector of blood, replace with new sterile needleless connector.

19. If unable to aspirate blood, repeat instillation of catheter clearance agent as ordered. Consider an overnight dwell time if possible.

20. Document in patient’s health record:
   - number of attempts
   - outcome of procedure
   - patient’s response to procedure
   - recommendations for any required changes in procedures for maintenance of catheter patency

21. Report information in step 20 to staff.
PROCEDURE 2
NEGATIVE PRESSURE TECHNIQUE WITHOUT STOPCOCK

INDICATION

- This technique may be used for a completely occluded catheter (cannot be flushed or aspirated).

EQUIPMENT

- Low level disinfectant for cleaning work surface
- Antiseptic swab(s)
- 10 mL syringe (2)
- 10 mL syringe filled with appropriate catheter clearance agent, as ordered
- 10 mL pre-filled normal saline syringe (2)
- Heparin/sodium citrate solution, as required to lock post procedure
- Non-coring needle primed with catheter clearance agent, as required for implanted port IVAD
- Medication label

PROCEDURE

1. Explain the procedure, including possible adverse effects of the catheter clearance agent.
2. Obtain baseline vital signs (temperature, blood pressure, respirations and pulse).
3. Clean the work surface with an appropriate disinfectant. Allow to dry.
4. Perform hand hygiene. Apply protective gloves.
5. Prepare catheter clearance agent as required. Use filter needle to draw up Alteplase.
6. **Scrub the hub.**
7. Attach empty 10 mL syringe to needleless connector.
8. Unclamp catheter, if required.
9. Gently withdraw plunger of syringe back to 8 – 9 mL and hold in place. This will create negative pressure in the lumen of the catheter. Clamp or pinch off catheter and remove syringe.
   
   **Note:** If blood return is achieved, remove empty syringe and immediately flush catheter, as required.
10. Attach syringe with catheter clearance agent.
11. Unclamp or un-pincho catheter.
12. If negative pressure was created in step 9, the agent will be drawn into the catheter.
13. If little or none of the catheter clearance agent has been drawn into the catheter, very gently instill the remaining agent into the catheter using a push-pull action. **DO NOT** use force when pushing on the plunger. This gentle push-pull action promotes the mixing of the fluids in the catheter to allow the
catheter clearance agent to begin breaking down the occlusion. This step may take time to instill the entire dose.

**Note:** during this step, hold syringe with plunger higher than the syringe connection with catheter, so that any air within the syringe is kept in the syringe and not accidentally injected into the catheter.

14. Label the lumen with a "Medication Added" label with the following:
   - DO NOT USE
   - medication
   - date
   - time
   - signature

15. Document in patient’s health record:
   - education
   - baseline vital signs
   - catheter clearance agent instilled
   - lumens instilled
   - do not use labeled lumen
   - dwell time required

16. If called to another unit to clear catheter: report to staff not to use catheter and when you will be back to withdraw clearance agent.

17. After appropriate dwell time, remove label, scrub the hub and attempt to aspirate.

18. If blood return noted, aspirate and discard 4-5 mL of blood.

19. Flush catheter well with at least 20 mL of normal saline using brisk push/pause method. If unable to clear needleless connector of blood, replace with new sterile needleless connector.

20. If unable to aspirate blood, repeat instillation of catheter clearance agent as ordered. Consider an overnight dwell time is possible.

21. Document in patient’s health record:
   - number of attempts
   - outcome of procedure
   - patient’s response to procedure
   - recommendations for any required changes in procedures for maintenance of catheter patency.

22. Report information in step 21 to staff.
PROCEDURE 3
NEGATIVE PRESSURE TECHNIQUE USING STOPCOCK

INDICATION

- This technique may be used for a completely occluded catheter (cannot be flushed or aspirated) and must be used if catheter clearance agent is supplied in a syringe smaller than 10 mL.

EQUIPMENT

- Low level disinfectant for cleaning work surface
- Protective gloves
- Antiseptic swabs
- 10 mL syringe (1)
- Syringe for drawing up catheter clearance agent – appropriate for volume required
- Catheter clearance agent – appropriate for occlusion, as ordered
- 4-way luer lock stopcock
- Needleless connectors (3)
- 10 mL prefilled normal saline syringe (2)
- Heparin or sodium citrate solution, as required to lock post procedure
- Non-coring needle primed with catheter clearance agent, as required for implanted port IVAD
- Medication label

PROCEDURE

1. Prepare catheter clearance, as required and draw into syringe. Use filter needle for Alteplase.
2. Explain the procedure, including possible adverse effects of the catheter clearance agent.
3. Obtain baseline vital signs (temperature, blood pressure, respirations and pulse).
4. Clean the work surface with an appropriate disinfectant. Allow to dry.
5. Perform hand hygiene. Don protective gloves.
6. Use aseptic technique, ensuring connection points remain sterile. Attach needleless connectors to the vertical and horizontal ends of the 4-way stopcock.
7. Attach syringe with catheter clearance agent to the horizontal end of the stopcock and turn the stopcock off to the vertical end.

8. Prime the horizontal end of the stopcock with the catheter clearance agent (it is unnecessary to prime the vertical end because it will only be used for aspiration).

9. Turn the stopcock off to the catheter end.
10. Pick up catheter. Clamp catheter if appropriate. Vigorously clean the needleless connector/catheter connection extending 1.5 cm below the needleless connector using antiseptic swab. Allow to dry.

11. Remove needleless connector from catheter lumen, using aseptic technique.

12. Apply the 4-way stopcock to catheter lumen.

13. Attach an empty 10 mL syringe to the vertical end of the stopcock. Turn the stopcock off to catheter clearance agent (horizontal end) and unclamp catheter, if required.
14. Using the empty 10 mL syringe, gently aspirate to 8 – 9 mL and hold it in place to create negative pressure within the lumen of the catheter.

15. While maintaining the negative pressure on the syringe, turn the stopcock off to the empty syringe (vertical end) and open to the catheter clearance agent (horizontal end). The negative pressure that has been created will assist in drawing the agent into the lumen of the catheter.
16. Clamp the catheter, if required, and turn the stopcock off to the catheter. Note how much catheter clearance agent has been drawn into catheter. Remove syringes from stopcock.

17. Remove the stopcock from the catheter and apply a new sterile needleless connector to the catheter.

**Note:** Stopcock may be left on during dwell time and used if remainder of dose or/and repeat dose of catheter clearance agent is required.

18. Label the lumen with a “Medication Added” label with the following:
- DO NOT USE
- medication
- date
- time
- signature
19. Document in patient’s health record:
   • education
   • baseline vital signs
   • catheter clearance agent instilled
   • lumens instilled
   • do not use labeled lumen
   • dwell time required

20. If called to another unit to clear catheter: report to staff not to use the catheter and when you will return to aspirate clearance agent.

21. Allow catheter clearance agent to dwell in catheter for appropriate amount of time.

22. Repeat vital signs, as necessary.

23. After appropriate dwell time, remove label and attempt to aspirate.

24. If blood return noted, aspirate and discard 4-5 mL of blood. If unable to clear needleless connector of blood, replace with new sterile needleless connector.

25. Flush catheter with 20 mL of normal saline using brisk push/pause method.

26. If unable to aspirate blood, repeat instillation of catheter clearance agent as ordered. Consider an overnight dwell time.

27. Document in patient’s health record:
   • number of attempts
   • outcome of procedure
   • patient’s response to procedure
   • recommendations for any required changes in procedures for maintenance of catheter patency.

28. Report information in step 27 to staff.
## Appendix 1 – Medical Protocol for Occlusion Management

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<th>Administration</th>
<th>Possible Adverse Reactions</th>
<th>Contraindications &amp; Precautions</th>
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| Alteplase (Cathflo)    | Thrombotic occlusions in central venous catheters  | Concentration: 2mg vial – 1mg/mL       | Instillation Volume 2ml or equal to volume of catheter lumen, if indicated Maximum dose = 4 mg weekly. | • febrile reaction  
• sepsis  
• bleeding  
• venous thrombosis | Contraindications  
• Known allergy to Alteplase or any components of the medication  
Precautions  
• Caution with patients who have active internal bleeding or who have had any of the following within 48 hours: surgery, obstetrical delivery, percutaneous biopsy of viscera or deep tissues or puncture of non-compressible vessels.  
• Caution with patients who have thrombocytopenia, other hemostatic defects or any condition for which bleeding is a significant risk or would be difficult to manage because of its location or who are at high risk for embolic complications (venous thrombosis in the region of the catheter)  
• Use in pregnancy only if potential benefit justifies the potential risk to the fetus.  
• Caution in the presence of known or suspected infection in the catheter |
|                        | Converts plasminogen to plasmin which dissolves the fibrin in a clot | Preparation:  
• Add 2.2mL sterile water for injection (non-bacteriostatic)  
• Do not shake vial – swirl and/or invert gently to mix  
• Use filter needle to draw dose into syringe. Discard filter needle. | Dwell Time  
• 30 – 120 minutes  
• May be left in catheter overnight if required  
• Aspirate and discard  
• May repeat dose x 1 if unsuccessful after 120 minutes. | Monitoring:  
• Baseline BP, pulse, resps and temperature | |
|                        | Stability:  
• Reconstituted vials may be stored for 8 hours at room temperature  
• Unreconstituted vials must be refrigerated | Ordering: Cathflo instill 2mg into ___lumen. Allow to dwell for 30 – 120 minutes then aspirate and discard. May repeat dose x 1. | | | |

**Note:** Refer to drug monographs or package inserts for more information