Purpose:

- To promote a standardized approach for the administration of alteplase for an occluded CVAD (non-hemodialysis catheters).

Scope:

- Document applies to all Registered Nurses who have the knowledge skill and judgment to assess and provide therapy for an occluded CVAD.

Signs and Symptoms of CVAD Occlusion:

- Stop the infusion and notify the physician if any of the following are observed with infusion or flushing:
  - Resistance when flushing
  - Sluggish flow
  - Inability to infuse fluids
  - Frequent occlusion alarm activated on IV pump
  - Infiltration or extravasation or swelling or leaking at the insertion site.
- Upon Aspiration of Blood:
  - Inability to aspirate blood (even if line flushes easily)
  - Sluggish Blood Return

Safety Precautions:

1. A physician's order for alteplase is required prior to administration.

2. Alteplase is indicated for use in treating a thrombosis related occlusion only

3. Caution to be exercised when administering a thrombolytic with patients who have had internal bleeding and/or who have had any of the following within the previous 48 hours:
   a. Coronary artery bypass graft
   b. Obstetrical delivery
   c. Organ biopsy
   d. Puncture of non-compressible vessels
   e. Haemostatic defects
   f. High risk for embolic complications, e.g., recent pulmonary embolism, deep vein thrombosis, endarterectomy

2. Do not use a thrombolytic to unblock a CVAD with a known or suspected catheter infection.

3. This protocol is not to be used for hemodialysis catheters (Refer to Medical Directive: Alteplase administration in Hemodialysis Central Lines)

4. **Do not administer** to patients with known hyper-sensitivity to Alteplase or any component of the formulation (L-arginine, phosphoric acid, polysorbate 80)

5. Stop treatment and notify the physician STAT if signs and symptoms of bleeding occur.

6. Medications are not to be added to alteplase solutions. Catheter must be properly labeled to prevent catheter usage while alteplase is dwelling.

Procedure:

Supplies:

- 2.2 mL of Sterile water for injection
- Prescribed amount of Alteplase
- Chlorhexidine swabs
- 10 mL empty syringe with blunt end needle
- 2x 10 mL empty syringe to aspirate line to assess for occlusion clearance
- 2x 10 mL pre-filled 0.9% Sodium Chloride syringe for post-alteplase flush
- Clean procedure gloves

NOTE: A physician's order for alteplase is required prior to administration.

Reconstitution

1. Inject 2.2 mL of sterile water (not bacteriostatic water) into the alteplase 2mg vial. Final concentration = 2mg/2ml.
2. Reconstituted solution is colorless to pale yellow transparent solution.
3. Alteplase lacks antibacterial preservatives and should be used immediately. Reconstituted solution may be used if labeled and stored at 2-30°C for up to 8 hours.
4. Direct the sterile water stream into the powder, foaming is usual.
5. Let vial stand to allow foam to dissipate.
6. Continue to reconstitute by gentle swirling, without shaking, until the contents dissolved.

Installation

1. Explain to the patient/family the reason for instilling the alteplase into their CVAD.
2. With a 10 mL syringe withdraw ordered amount of solution from the reconstituted vial.
3. Inspect the solution for foreign matter and discoloration.
4. Scrub the cap/hub of the lumen with chlorhexidine for 15-30 seconds and let dry
5. Leur lock the syringe to the blocked lumen of the CVAD.
6. Instill as a bolus use push/pull technique to gently inject alteplase.
7. Avoid injecting quickly or with force as may damage lumen and/ or cause blood clot to dislodge.
8. Only a small amount of alteplase may flow into the blocked catheter. It is not necessary to instill the full volume into the catheter to produce clot lyses. Success can result with small amount of alteplase.

9. Clearly label catheter lumen with the dwelling alteplase, and apply sterile dead-end cap to catheter to ensure the lumen is not used.
10. Explain to the patient/family that no additional medication can be administered through the catheter while the alteplase is dwelling.
11. Ask the patient to report any new signs of bleeding immediately.

Dwelling time

1. Stop all infusions into CVAD during thrombolysis to achieve maximum effectiveness (if possible).
2. Leave Alteplase to dwell in lumen for 30 minutes.
3. After 30 minutes assess catheter patency by attempting to aspirate blood and catheter contents.
    a. If catheter function is restored, withdraw 4-5 mL of blood to remove alteplase and any residual clot and discard. Flush the affected catheter lumen with 20 mL of sterile 0.9% NaCl
    b. If catheter function is not restored, re-inject any alteplase from the syringe back into the catheter and increase the dwelling time to another 90 minutes, 120 minutes in total.
4. After a total of 120 minutes dwell time, assess if catheter patency has been restored by attempting to aspirate blood and catheter contents.
    a. If catheter function is restored, withdraw 4-5 mL of blood to remove alteplase and any residual clot and discard.
    b. Flush the affected catheter lumen with 20 mL of sterile 0.9% NaCl
5. If catheter function is not restored after first dose of alteplase, a second dose may be instilled. Repeat the steps 1-4 of procedure including dwelling times. A physician's order to repeat alteplase may be required if repeat dose was not included in the initial order.
6. If CVAD lumen remains blocked after second alteplase attempt, clearly label catheter lumen with the alteplase and apply sterile dead-end cap to catheter to ensure the lumen is not used. Notify physician of continued line occlusion. Consider assessing line patency after 24-72 hours of dwell time as clearance may have resulted from the long contact time with alteplase.
7. If occlusion continues after extended dwell time, consider non-thrombosis causes of occlusion.

Definitions:

- CVAD occlusions can be categorized into 3 different types:
    - Mechanical (internal or external problems with the catheter)
        - Catheter malposition
        - Mechanical failure (i.e. clamps, kinked tubing or blocked CVAD cap)
        - Constriction of catheter (i.e. suture to tight kinked catheter)
    - Thombosis – most common type of occlusion and often responds to alteplase
        - Intraluminal – a clot within the catheter
        - Fibrin tail – fibrin at end of catheter acting like a one-way valve
        - Fibrin sheath – fibrin attaches to the outside of a catheter creating a "cock" or the end or the entire length of the catheter; can result in serious infiltration/extravasation complications or mixing of incompatible solutions

        - Mural – fibrin from a vessel wall injury binds to the fibrin on the surface of the catheter; can progress to venous thrombosis partially or completely occluding the vein.
    - Chemical
        - Medication precipitate in the catheter resulting from incompatible drugs or solutions
        - Lipid residue
        - Does not respond to alteplase for catheter clearance

Related Documents

Central Venous Access Devices - Policy
Central Venous Access Devices - Flushing Procedure
Hemodialysis Central Venous Catheter Management Policy and Procedure
Medical Directive: Alteplase Administration in Hemodialysis Central Lines

Key Words

Central Line, PICC line, Port-a-cath, Cathflo, Alteplase, t-PA, blockage

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Reviewed by/Consultation with: (list position titles)

Signed by: _____ (Archived Copy Only)

Title: _____