Hemodialysis: Alteplase (t-PA) Infusion into AVF or Graft

Related Standards and Resources:

1. B-00-12-10058 – Hemodialysis: Alteplase Instillation into Blocked Central Venous Catheter, procedure for
2. Standard Precautions: Infection Control Manual. Face Protection: Goggles and Face Shields, Gloves, Gowns, and Protective Apparel
3. B-00-12-10004 – Equipment: IVAC Signature Edition (Alaris) Volumetric Infusion Pump, (7130 and 7230)
4. PDTM – Parenteral Drug Therapy Manual: Alteplase
5. Appendix A - PH434 - Prescriber's Orders – Alteplase (CATHFLO) For Partially Occluded Hemodialysis Arteriovenous fistula or Arteriovenous Graft
6. Occupational Health and Safety – Cytotoxic Handling

Skill Level: Specialized

Registered nurses who have completed the required education and who provide care in a PHC Renal Program in-centre hemodialysis specialty area can perform this procedure.

Need To Know:

1. For alteplase infusion that is given only in an in-centre hemodialysis unit, a pre-printed prescriber's order can be obtained from chart scan (see Appendix A)
2. Alteplase is **contraindicated** in patients with:
    - A known hypersensitivity to the ingredients.
    - Active internal bleeding, active peptic ulcer disease.
    - Recent (within 3 months) stroke, intracranial or intra-spinal surgery, intracranial neoplasm
    - Any of the following within 48 hours: coronary bypass graft surgery, obstetrical delivery, organ biopsy, or puncture of non-compressible vessels.
    - Thrombocytopenia (platelet less than 50), Hgb less than 90, active bleeding, active liver disease or coagulopathy.
    - Severe uncontrolled hypertension (DBP more than 110, SBP more than 180).
    - Recent prolonged cardiopulmonary resuscitation and recent (within 10 days) of severe trauma.
    - IM injections.
3. For acute lysis of AVF and AVG, maximum alteplase 4mg/day can be given:
    - on days that patients have NOT received alteplase in Radiology;
    - on weekdays when vascular team has confirmed problematic access
    - as recommended by radiologist;
    - OR on weekends or evenings when on-call nephrologist sees fresh clots but access is still functional.

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4. In treating AVF/AVG-related thrombi, alteplase is infused near the clot burden to attain local high-level concentrations with relatively low total doses.
5. If a minimal blood pump speed can be achieved on the initiation of hemodialysis (200 mL/min) alteplase infusion can be initiated to restore access function.
6. Alteplase is a thrombolytic agent that works by binding to fibrin in a thrombus, then converting the entrapped plasminogen to plasmin resulting in local fibrinolysis (i.e. digests fibrin and dissolves blood clot).
7. Alteplase vials need to be protected from light and kept in the original box until needed. Alteplase vials do not contain antibacterial preservatives and should be stored in a refrigerator at a temperature between 2 and 8 degrees Celsius and reconstituted immediately before use. The solution must be used within 8 hours following reconstitution when stored between 2 and 30 degrees C.
8. Alteplase must be reconstituted with Sterile Water for injection. Mix gently with a swirling motion. **Do not** shake the vial to dissolve.
9. Heparin and alteplase are incompatible when mixed together, however it is acceptable to run a heparin infusion through the hemodialysis blood circuit to prevent clotting.
10. Thrombus formation can occur anywhere in the out flow vein tract but especially in aneurysmal and pseudoaneursymal areas.
11. If a renal patient arrives to dialysis with two sheaths inserted from thrombolysis, it is acceptable to use the sheaths for hemodialysis. If the venous sheath is retrograde, consult with transonic nurse to determine the degree of recirculation. Use the alignment that has the lowest percentage of recirculation or the nurse may need to reinsert an antegrade venous needle.

Practice Guideline:

Equipment and Supplies:

1. Minibag containing 0.9 % NS (50 mL)
2. 3 mL luer lock syringe (2 to 3)
3. Alteplase 2 mg vial (1 to 2)
4. 18 g needle (1 to2)
5. Alcohol swabs
6. Medication label
7. CareFusion Alaris PC Guardrail pump
8. SmartSite infusion tubing set #2420-007
9. Sterile Water 10 mL vial for injection

STEPS	RATIONALE
1. Prepare the required number of alteplase vials based on the dosage order by the prescriber. (See Appendix A)	

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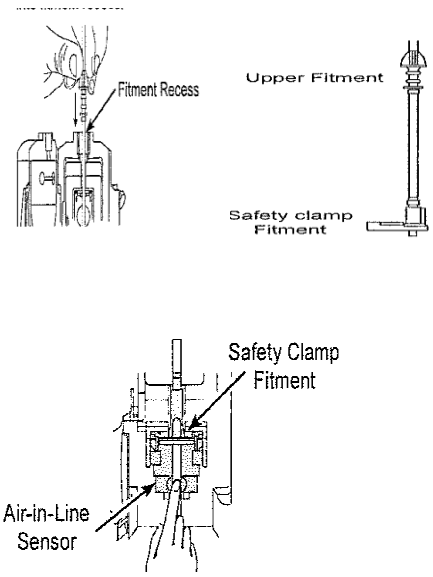
2. Reconstitute Alteplase according to manufacturer's instructions with **sterile water only.** (See Appendix A)	
3. Add alteplase into minibag for infusion and attach label	
4. Prepare administration set: • Remove IV infusion set from package • Prime infusion tubing set • load into pump with the upper fitment positioned into fitment recess • press Safety Clamp fitment into recess in pump module • firmly press tubing into air-in-line sensor	This ensures that air is removed from the tubings to prevent possible embolism prior to connection to AVF/AVG needles access 
5. Plan to insert arterial or venous needles near the clot burden	
6. Commence alteplase infusion to run over one hour.	
7. During infusion, monitor and document Q15 min: vital signs, including signs and symptoms of adverse complications (e.g. bleeding, allergic reaction).	

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Post Alteplase Infusion:

1. Alteplase infusions may need to be done on more than one treatment. Obtain prescriber order to the number of treatments needed.
2. Transonic monitoring of access flows may be ordered as per assessment by the vascular access team. .
3. Ensure patient is monitored for signs and symptoms of sepsis (positive blood cultures within 24 hours or temperature 38 degree Celsius and above); serious bleeding episodes (e.g. gastrointestinal, intracranial) and bruising; hypotension (e.g. dizziness), and allergic reaction (urticaria, rash) at least for 30 minutes after alteplase infusion is completed before patient is allowed to go home. If any of the above adverse events occur, do not allow patient to leave, but immediately, notify MD and initiate appropriate interventions.

Patient Education and Resources:

1. Instruct patient to observe and report any signs of bleeding, bruising, rash, or urticaria 30 minutes after Alteplase infusion or while waiting to go home.

Documentation:

1. Interventions: MD notification, additional monitoring and procedures performed.
2. Alteplase dose and rate of infusion in outpatient monthly medication administration record (MMAR) and interdisciplinary progress notes
3. Alteplase dose and method given in the TPA record binder for tracking.

References:

1. Allon, M. & Maya, I. (2018). UpToDate®. Literature review: *Hemodialysis arteriovenous graft dysfunction and failure.* Wolters Kluwer. Retrieved April 4, 2018 from www.uptodate.com
2. Beathard, G., & Cull, D. Schwab, S., Berns, J., Collins, K. (Editors). (2018). UpToDate ® Literature review: *Thrombosis associated with chronic hemodialysis vascular access.* Wolters Kluwer Health. Retrieved on March 20, 2018 from www.uptodate.com
3. Counts, C., (Ed.) (2015). Core Curriculum for Nephrology Nursing Sixth Edition, Module 3. *Vascular Access for hemodialysis.* Chapter 3, Section B, pages 176-196 and Section C, pages 197-205. American Nephrology Nurses' Association, Pitman, NJ.

Persons/Groups Consulted:

Clinical Practice Group, PHC Renal Program
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Appendix A – Pre- Printed Order (PH434) - Alteplase (Cathflo) for Partially Occluded HD AV Fistula or AV Graft

IF YOU RECEIVED THIS FAX IN ERROR,
PLEASE CALL 604-806-8886 IMMEDIATELY

Providence HEALTH CARE **PRESCRIBER'S ORDERS**

NO DRUG WILL BE DISPENSED OR
ADMINISTERED WITHOUT A COMPLETED
CAUTION SHEET
ALLERGY/INTOLERANCE STATUS FORM (PHC-PH047)

DATE AND TIME

ALTEPLASE (CATHFLO) FOR PARTIALLY OCCLUDED HEMODIALYSIS AV FISTULA OR AV GRAFT OUTPATIENT ORDERS

(Items with check boxes must be selected to be ordered) **(Page 1 of 1)**

∗∗ **NOTE: do not premix reconstituted alteplase with sodium chloride 0.9% in same syringe** ∗∗

To be ordered and given on hemodialysis unit only under the following circumstances:

- On days when patient has **NOT** received alteplase in Radiology
- Patient DOES NOT have thrombocytopenia (platelet below 50), Hgb below 90, active bleeding, active liver disease, or coagulopathy
- On weekdays by vascular access team for a confirmed problematic access as recommended by Radiologist or on weekends or evenings by on-call nephrologist for problematic access where fresh clots are seen but access is still functional

See reconstitution instruction for alteplase on reverse

Supporting References:

Hemodialysis: Alteplase (t-PA, CATHFLO) Infusion During Hemodialysis, into an arteriovenous fistula (AVF) or arteriovenous graft (AVG) post Thrombectomy, procedure

☐ alteplase 2 mg in sodium chloride 0.9% 100 mL via the fistula needle over 60 minutes according to protocol. May repeat a second dose within the same HD run for problematic AVF or AVG. Notify physician if a second dose is given.

☐ alteplase 4 mg in sodium chloride 0.9% 100 mL via the fistula needle over 60 minutes according to protocol.

Total dose of alteplase should not exceed 4 mg/24 hours

Printed Name | Signature | College ID | Pager

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ALL NEW ORDERS MUST BE FLAGGED
FAX COMPLETED ORDERS TO PHARMACY PLACE ORIGINAL IN PATIENT'S CHART

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RECONSTITUTION INSTRUCTION FOR ALTEPLASE

Reconstitute immediately before use as there is no preservative in alteplase vials. Do not premix reconstituted alteplase with sodium chloride 0.9% in same syringe.
The reconstituted solution may be used within 8 hours following reconstitution when stored at 3 to 30°C.

PROCEDURE FOR INFUSION OF ARTERIOVENOUS FISTULA OR GRAFT USING ALTEPLASE 2 mg OR 4 mg DOSE

a) To prepare 2 mg dose:
   1. Using aseptic technique, withdraw 2.2 mL of sterile water for injection. Do **NOT** use bacteriostatic water for injection for reconstitution.
   2. Inject the 2.2 mL of sterile water for injection into the alteplase 2 mg vial, directing the diluent stream into the powder. Slight foaming is not unusual; let the vial stand undisturbed to allow large bubbles to dissipate.
   3. Mix by gently swirling until the contents are completely dissolved. **DO NOT SHAKE.** The reconstituted preparation results in a colourless to pale yellow transparent solution containing alteplase 1 mg/mL.
   4. Withdraw 2 mg (2 mL) of solution from the reconstituted alteplase vial and inject into sodium chloride 0.9% 100 mL.

b) To prepare 4 mg dose:
   1. Using aseptic technique, withdraw 2.2 mL of sterile water for injection. Do **NOT** use bacteriostatic water for injection for reconstitution.
   2. Inject the 2.2 mL of sterile water for injection into the alteplase 2 mg vial, directing the diluent stream into the powder. Slight foaming is not unusual; let the vial stand undisturbed to allow large bubbles to dissipate.
   3. Mix by gently swirling until the contents are completely dissolved. **DO NOT SHAKE.** The reconstituted preparation results in a colorless to pale yellow transparent solution containing alteplase 1 mg/mL.
   4. Repeat above steps 1 to 4 to prepare a second reconstituted alteplase 1 mg/mL vial.
   5. Withdraw 2 mg (2 mL) of solution from each of the two reconstituted alteplase vials and inject 4 mg (4 mL) into sodium chloride 0.9% 100 mL.

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