JOINT CLINICAL POLICY
INTRAPLEURAL FIBROLYTICS: ALTEPLASE (TPA) AND PULMOZYME (DNASE)

PURPOSE:
For the drainage of a loculated empyema, malignant loculated pleural effusion, or clotted hemothorax. The goal is for the Alteplase and Pulmozyme to break down any pockets of purulence or fibrin within the pleural space that may impair the drainage of a pleural effusion.

POLICY:
It is the policy of the hospital that a Registered Nurse who has the knowledge, skill and ability to perform this competency may instill Alteplase followed by Pulmozyme into the pleural space through a chest tube as per the order of a Physician or Nurse Practitioner.

If Alteplase, in conjunction with Pulmozyme is ordered, each medication is instilled separately according to the PowerPlan order set, "Intrapleural Instillation of Alteplase (tPA) and Pulmozyme (DNase)" and instillation occurs at **q12h intervals at 0900 and 2100** for Alteplase and **1100 and 2300** for Pulmozyme.

In the interest of patient comfort and safety, Alteplase/Pulmozyme instillations should **not begin** before 0900 or after 2100. If it is ordered after 2000 hours, the dose should be held until the next day.

INCLUSION CRITERIA:
Patients 18 years of age and older requiring chest tube therapy.

EXCLUSION CRITERIA:
Patients under 18 years of age.

DEFINITIONS:
Intrapleural Alteplase/Pulmozyme Instillation: The delivery of the aforementioned medications into the pleural space.

BACKGROUND:
Alteplase is ordered and supplied as 6 mg or 10 mg doses in 30 mL of 0.9% sodium chloride and will be prepared and supplied by Pharmacy in pre-filled syringes. Pulmozyme (DNase) is ordered and supplied as a kit for the unit level staff to prepare as 5 mg in 30 mL of sterile water. Pulmozyme should be administered 2 hours after the Alteplase to minimize intrapleural drug admixture. The order for the procedure will be part of a PowerPlan that includes various options for different dosing, frequency and duration of the therapy based on specific patient requirements.

EQUIPMENT:

If instilling into chest tubes:	If instilling into pigtail/Cook catheter:
▪ Sterile Gloves	▪ 70% isopropyl alcohol swabs
▪ Two chest tube clamps	▪ 3-way stopcock
▪ Waterproof tape	▪ Needleless/blue cap
▪ 10mL slip tip syringe	▪ Clean gloves
▪ 0.9% sodium chloride	▪ 10mL prefilled 0.9% sodium chloride syringe
Mask	
Eye protection	
Alteplase as mixed by pharmacy	
Pulmozyme kit from pharmacy	

PROCEDURE:

Monitoring includes:

- Respiratory assessment before and after each instillation.
- Vital signs and oxygen saturation before each instillation and **1 hour post** of procedure.

1. Review the PowerPlan in the electronic medical record including specific details such as dose, frequency, additional steps, comments and repeat dosing requirements
2. Ensure that the patient does not have an allergy to the chemical to be instilled.
3. Verify the patient using two patient identifiers as per CLN-P-41 Positive Patient Identification (PPID) Joint Policy GRH & SMGH.
4. Administer analgesia 15 minutes prior to each instillation, according to prescriber orders.
5. Mark the time and date on the chest tube drainage system at the current level of drainage (this will help determine the amount of drainage that occurred after the procedure).
6. Obtain the Alteplase from pharmacy in a prepared syringe. Do not heat or shake the solution. Use at room temperature. Clarify with prescriber which chest tube is to be utilized if more than one chest tube is in place.
7. Turn off suction to the chest tube.
8. Position the patient in a lateral position with the affected side up (the side containing the chest tube). Patient's bed should be as flat as possible (so as not to pool tPA mixture at base of chest cavity)

For Chest Tube Administration

1. Double clamp the chest tube using rubber tipped Kelly clamps.
2. Wash hands, don mask with face shield, and apply sterile gloves
3. With the chest tube clamped, disconnect the chest tube from the drainage system tubing and insert medication syringe into the end of the chest tube.
4. Remove both rubber tipped Kelly clamps
5. Instill contents of syringe into the chest tube over 1-2 minutes.
6. While syringe is still in place, reclamp the chest tube.
7. Remove Alteplase syringe and insert 10 mL 0.9% sodium chloride flush syringe tip.
8. Remove clamps and instill contents of syringe over 1minute.
9. Reapply both clamps and remove syringe.
10. Re-connect the drainage system tube to the chest tube and securely re-tape this connection using waterproof tape but leave the chest tube clamped for 1 hour or as specified by the physician or prescriber, unless the patient is unable to tolerate.
11. After clamping time is complete, remove clamps, ensure chest tube is functioning, and re-attach to suction if ordered.

For Pigtail/Cook Catheter Administration

1. Wash hands, don mask, eye protection and clean gloves
2. Prime and connect three-way stopcock at catheter end/drainage tubing connection (if not already done) with needleless connector (aka blue cap) attached to “top” port
3. Turn stopcock off to drainage system
4. Cleanse needless connector with 70% isopropyl alcohol and attached syringe
5. Instill contents of the syringe into the chest tube over 1-2 minutes
6. Remove Alteplase syringe and flush the tube with 10mL prefilled 0.9% sodium chloride syringe
7. Leave stopcock off to drainage system for 1 hour or as specified by the physician or prescriber, unless the patient is unable to tolerate

Two (2) hours after Alteplase is administered:

1. Obtain the Pulmozyme kit which is supplied by pharmacy. Prepare the Pulmozyme by diluting it with 30 mL sterile water and transfer to the appropriate syringe type.
2. Turn off suction to the chest tube if specified in the orders.
3. Position the patient in a lateral position with the affected side up (the side containing the chest tube). Patient’s bed should be as flat as possible (so as not to pool tPA mixture at base of chest cavity)
4. Following steps as outlined above for chest tube or pigtail catheter administration of medication

Monitor for, notify physician or prescriber, unclamp the chest tube and stop procedure if any of the following occur:

- Hemoptysis
- Fever
- Patient develops anaphylaxis symptoms or becomes hemodynamically unstable
- Chest pain at the chest tube site, erythema, transient confusion and nausea
- Respiratory distress (may include, but is not limited to): Increasing anxiety, dyspnea, pain, changing breath sounds, accessory muscle use, decreasing oxygen saturation levels, or increasing oxygen requirements.
- Any drainage around the chest tube site
- Sudden presence of bloody drainage from the chest tube or around the chest tube site and the patient develops any hemodynamic instability symptoms
- Patient develops a new air leak from the chest tube. Contact the physician/NP for clamping instructions prior to administering the next dose.

DOCUMENTATION AND/OR COMMUNICATION:

- Pre and post respiratory assessment for each instillation
- Vital signs, including oxygen saturation
- Date and time procedure was performed
- Patient tolerance of procedure, chest tube site, and side effects
- Patient/family teaching – medication, side effects, and turning / repositioning
- Chest tube drainage post instillation
- Medication administration (MAR) using barcode scanning procedures outlined in the Joint Medication Administration Policy CLN-M-36

EDUCATIONAL REQUIREMENT:

The Registered Nurse will review this policy/procedure prior to instilling medication or chemical agents through a chest tube. The first time this skill is performed, it should be demonstrated to another RN with the knowledge and skill.

QUALITY MONITORING PROCESS:

Any staff member identifying potential or actual adverse outcomes resulting from implementation of this policy will follow the incident reporting process as per the Patient and Visitor Reporting Policy and Procedure (GRH) or the Incident Reporting and Management Policy (SMGH).

RELATED DOCUMENTS:

CLN-P-41: Positive Patient Identification (PPID) - Joint GRH & SMGH Policy
CLN-D-185: Documentation Policy, Joint Clinical GRH & SMGH
CLN-M-36: Medication Administration Policy - Joint GRH & SMGH
CLN-A-27: Adverse Drug Reaction and Medical Device Incident Reporting (Vanessa's Law) - Joint GRH & SMGH Policy

REFERENCES:

Chin, K. N. & Lim, T. L. (1996). Controlled trial of intrapleural Streptokinase in the treatment of pleural empyema and complicated parapneumonic effusions. *Chest, 111*(2).

Jeres-Sanchez, C., Ramizrez-Rivera, A., Elizalde, J.J., et al. (1996). Intrapleural fibrinolysis with Streptokinase as an adjunctive treatment in hemothorax and empyema: A multicenter trial. *Chest, 109*(6).

Lee-Chiong, T. L. (1997). Treating empyema without surgery. *Postgraduate Medicine, 101*(6).

London Health Sciences Centre (2010). Pleural fibrinolysis with Alteplase (tPA) preprinted order (NS6370).

Rahman, N.M. et al. (2011). Intrapleural use of Tissue Plasminogen Activator and DNase in pleural infection. *New England Journal of Medicine, 365*, 518-526.

Skeete D., Rutherford E., Schildt S., Abrams J., Parker L. & Preston R. (2004). Intrapleural Tissue Plasminogen Activator for complicated pleural effusions. *The Journal of Trauma Injury Infection and Critical Care*, 1178-1188.

Temes, R. T., Follis, F., Kessler, R. M. et al. (1996). Intrapleural fibrinolytics in management of empyema thoracis. *Chest, 11*(1).

The Ottawa Hospital (2012). Intrapleural instillation (SPO 145).

Wait, M. A., Sharma, S., Hohn, J. & Dal Nogare, A. (1997). A randomized trial of empyema therapy. *Chest, 111*(6).

Walker C., Shirk M., & Visconti, J. (2003). Interpleural Alteplase in a patient with complicated effusion. *The Annals of Pharmacology, 37*, 376-379.

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