Chest Tubes: Large Bore - Assisting with Insertion

Chest Drainage System: Pleur-Evac® Sahara

Site Applicability

All VCH & PHC Acute Care sites

Practice Level

Registered Nurses

- Registered Nurses (RN) are responsible for monitoring and managing patients with pleural chest tubes and chest drainage systems, with the Physician or Nurse Practitioner (NP).

Policy Statement

1. Emergency equipment stays with the patient at all times and must accompany the patient on transport. See Emergency Equipment
2. Use aseptic technique when accessing chest tubes, chest drainage systems, or insertion sites.
3. Using their knowledge, skills and judgment, the RN assesses risk to patient stability during transport off the unit. The nurse collaborates with the Physician, NP and interdisciplinary team to identify staff with the appropriate skill set to accompany the patient on transport.

   VCH: VA & Richmond: See D-00-07-30106 Transport for Tests/Treatment: Patient Accompaniment
4. Patients with pleural chest tubes leaving the unit for diagnostic tests or treatments are accompanied by an RN (or have tests done portably) when:
   - Assessment of an air leak is between the range of 4 to 7 on the Pleur-Evac®
   - Chest Tube was inserted in the last 24 hours
   - Drainage exceeds these volumes:
     - Sanguinous drainage over 100 mL/hr
     - Serous fluid over 1000 mL/hr
   - Suction is required during transport (if ordered)

   Or with clinical conditions that require frequent monitoring or nursing interventions of the:
   - Airway and respiratory system
   - Hemodynamic and cardiopulmonary system
   - Neurological system
     - Close or constant care
     - Elopement risk; risk to self or others
5. **PHC & Richmond Hospital**: Instillation of medication or other substances into a chest tube is a Physician or Nurse Practitioner responsibility.

   VCH: **VGH:** See PCG C-520: Pleurodesis
6. Chest tube removal is a Physician or Nurse Practitioner responsibility, except when the skill is within the competency list of unit/program, and after education from a Nurse Educator or delegate.

   PHC: NCS5431: Chest Tube Removal Post Cardiac Surgery (CSICU)

   VCH: VGH & LGH only: D-00-12-30007: Pleural Chest Tube Removal

Need to Know

1. The Physician inserting the chest tube obtains informed consent for the procedure.
2. Review coagulation results and medications altering clotting factors. Report lab abnormalities or medications to the Physician or NP. Inform them if the patient is on anticoagulants.
3. Ensure the patient has **patent** IV access
4. The RN monitors the patient throughout the chest tube insertion procedure. See Assisting with procedure.
5. If the Physician or Nurse Practitioner uses procedural sedation for chest tube insertion refer to :
   PHC:
   - NCS6259: Protocol for Procedural Sedation in Clinics and Procedure Rooms or
   - NCS6388: Protocol for Procedural Sedation and Analgesia (PSA) Emergency Departments

   VCH:
   - D-00-12-30079: Procedural Sedation and Analgesia PSA - General or
   - D-00-12-30078: Procedural Sedation and Analgesia PSA - Emergency Department
6. An order is required from a Physician or Nurse Practitioner (NP) to apply or discontinue suction to a chest tube. See Preprinted Prescriber Orders where available
7. Chest tubes must be attached to an approved chest drainage system (CDS). Consult with the Physician or NP before changing another system to a Pleur-Evac® or other approved chest drainage system. See Maintenance of the Pleur-Evac® Chest Drainage System.
8. Clamping chest tubes requires a Physician or NP order. Before clamping, assess the patient and chest drainage system for an air leak. If there is bubbling in the air leak meter with deep breathing or coughing, do **not** clamp the chest tube. Notify the Physician or NP for an order (unless changing the chest drainage system, assessing for an air leak or other situations listed in Maintenance of the Pleur-Evac® Chest Drainage System: Clamping.
9. Do not clamp a chest tube during transport or while mobilizing, unless specifically ordered by the Physician or Nurse Practitioner.
10. The practice of manipulating a chest tube to dislodge a clot or drainage by milking is contraindicated without a Physician or Nurse Practitioner order, except in the Cardiac Surgery Intensive Care Units.

Quick Links

1. Assisting with insertion procedure
2. Setting up the Pleur-Evac® Chest Drainage System
3. Dressing the Insertion Site
4. Emergency Equipment
5. Patient and Family education

Equipment & Supplies

PHC:

- **St, Paul's Hospital (SPH):**
  - Centesis tray and equipment cart from Medical Device Reprocessing Department (MDRD)
- **Mount St. Joseph Hospital (MSJ):**
  - Same equipment as above or Emergency Chest Tube Insertion tray and Local Anesthetic tray

VCH:

- **Vancouver Acute (VA):**
  - Selection of chest tubes, sizes 24, 26, 28, 30
  - Chest tube insertion tray with:
    - 1 – 10 mL syringe
    - 1 each of 25, 21 and 18 gauge needles
    - 1 scalpel blade
    - Sutures – 3-0 silk curved needle and 0 silk straight needle
  - Dressing tray
  - Sterile gloves
  - Mepore 4" cloth tape
  - Chest Drainage System
- **Coastal:**
  - Procedure tray
  - Selection of chest tubes, sizes 40 (2), 36, 32, 28, 24, 20, 16, 10
  - 3 – 10 mL syringes
  - Needles 18 and 25 gauge
  - 5 – 0 silk straight needles
  - Sterile 2 X 2
  - Mepore 4" cloth tape
  - 2 Heimlich valves
  - 2 pneumothorax sets
  - 2 forceps
  - Scalpel size 10
  - Chest Drainage System
- **Richmond:**
  - Chest tube insertion tray
  - Chest tubes (appropriate sizes), as per Physician preference, or a Heimlich valve
  - 2 rubber tipped Kelly forceps
  - 1 – 10 mL syringe
  - Needles 18 and 25 gauge
  - 0-Silk on a straight needle suture
  - Sterile gloves and gown for the Physician
  - Pleur-Evac® (or other approved chest drainage system)

ALL: Additional Equipment & Supplies:

- Suction Equipment (set up and functional)
- Emergency Equipment (List and Policy)
- Personal protective equipment: Goggles/face shield, mask, gown, gloves
- Skin Prep – Tinted 2% Chlorhexidine and 70% Alcohol solution, swab stick, or Solu-prep wipe
- Local anesthetic – Lidocaine 1% or 2%
- 4 – 4x4 gauze and 2 – 4 x 4 drain gauze
- Petroleum impregnated gauze
- Mepore®, Mefix ® or other adhesive island dressing for light drainage
  - White cloth zinc tape (for spiral taping connections) (PeopleSoft #00023539) or nylon cable ties if used
  - Scissors
  - Sterile specimen container

Procedure: Assisting with Insertion

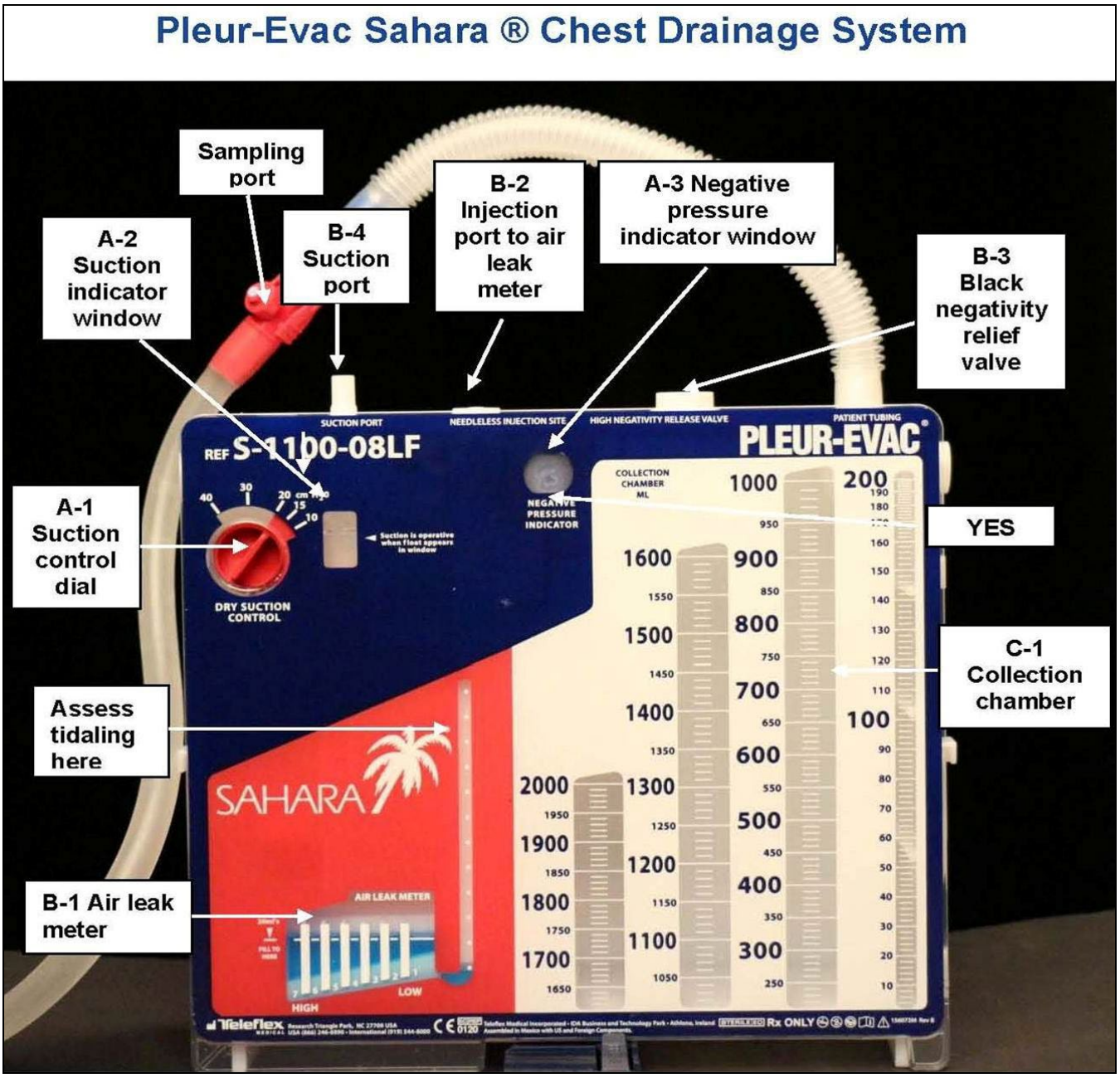
1. The Physician inserting the chest tube obtains informed consent (before administration of narcotics or sedatives).
2. Report coagulation tests abnormalities and medications affecting clotting factors to the Physician.
3. Educate the patient and family on the chest tube insertion procedure. See Patient and Family Education
4. Perform hand hygiene.
5. Put on personal protective equipment (PPE).
6. Verify the patient's identification as per policy.
7. Ensure **patent** IV access.
8. The RN monitors and documents vital signs, cardiopulmonary assessment (Patient Assessment & Interventions), and pain:
    - Before the procedure
    - Continuous (automated) BP, pulse and pulse oximetry monitoring every 5 minutes during the procedure
    - After the procedure (see below)
9. Prepare the chest drainage system as per instructions in the package and below.
10. Administer analgesic at appropriate time for peak effect at insertion time.
11. Position patient for the procedure as requested by the Physician.
12. Assist the Physician preparing the Lidocaine syringe (for local anesthetic of the insertion site).
13. Label all medications as per protocol VCH and PHC Preparation of Parenteral Medications for Administration by Syringe.
14. Reassure the patient throughout the insertion procedure.
15. After the chest tube is inserted, remove the cap from the long drainage tubing of the Pleur-Evac® collection chamber. Keeping the exposed end sterile, connect it to the chest tube.
16. Assist the Physician with applying the dressing as per Dressing the Insertion Site.
17. After the procedure, the RN monitors and documents vital signs, cardiopulmonary assessment, chest tube drainage, air leak and pain:
    - Q15 min x 2
    - In 30 min x1
    - Q1 hour x 4
18. Spiral tape all connections with white cloth zinc tape or secure with nylon cable ties (if used). Waterproof tape is difficult to remove and may increase the risk of accidental disconnection.
    - Leave connector unobstructed to allow visualization of drainage
    - Tape over the ends to reinforce
19. If the Physician orders and collects a specimen of pleural fluid, transfer it to the appropriate labeled specimen container. See Maintenance of the Pleur-Evac® Chest Drainage System: Collecting a Specimen.
20. The Physician inserting the chest tube is responsible for safe removal of sharps
21. Arrange for a chest x-ray or ultrasound as per Physician or NP order. See: Policy Statements

    VCH: VA & Richmond: Transport for Tests/Treatment: Patient Accompaniment

For information about ongoing assessment and monitoring, see

- Preprinted Orders (where available)
- Patient Assessment and Interventions
- Maintenance of the Pleur-Evac® Chest Drainage System
- Basic skills text (electronic or hard copy), Assessment of Thorax and Lungs

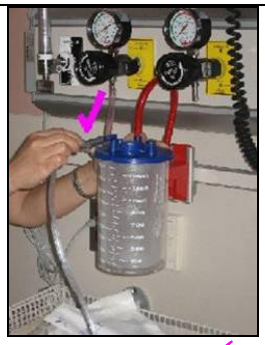
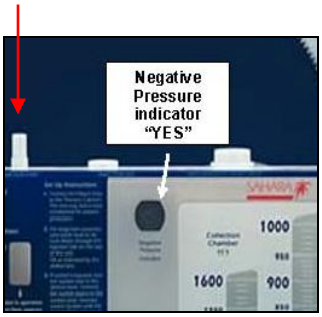
Setting up the Pleur-Evac Sahara® Chest Drainage System (CDS)

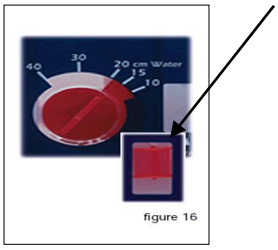


Chest Tubes and Chest Drainage Systems: Patient Assessment and Interventions

Nursing interventions aim at maintaining patency and sterility of the chest drainage system, monitoring for complications and evaluating the effectiveness of medical treatments and/or nursing care.

If the patient is in respiratory distress at any time despite interventions, call the Physician or NP immediately, or call a code

Procedure	Important Information
1. To set up the Pleur-Evac® chest drainage system, follow the instructions on the package insert.	
2. Ensure the suction device and tubing is set up and functional. Suction tubing **must** be connected to the suction drainage container.	  **Correct ✓** **Incorrect X** To reduce the risk of fluid or chest tube drainage entering the wall suction system, do **not** connect suction tubing directly to wall suction regulator.
3. Stabilize the chest drainage system on the floor stand, or hang it on the bed or stretcher from the attached hooks	To promote drainage and prevent backflow into the pleural space, keep the chest drainage system below the level of the insertion site
4. Ensure the blue C-Clamp supplied with the chest drainage system remains open. To prevent accidental closure, place the clamp away from the patient or remove it.	• The C-clamp occludes fluid only, not air • If clamping is ordered, use 2 non-toothed forceps per chest tube (plastic or stainless steel). See Maintenance of the Pleur-Evac® Chest Drainage System: Clamping.  OR 
5. Fill the air leak meter (B-2) with the supplied 20 mL sterile saline syringe	• The air leak meter must be filled to assess tidalling and to quantify the size of an air leak from 1 (low) to 7 (high)
6. For gravity drainage, keep the suction port (B-4) open to air and unobstructed. 	• Normal intrapleural pressure is always negative. Negative pressure decreases with inspiration and increases with expiration • The one-way valve on the chest drainage system allows air to exit on expiration and prevents atmospheric air from entering on inspiration • When on gravity drainage, the negative pressure indicator "YES" may be seen intermittently with patient respirations • When on suction drainage, the negative pressure indicator "YES" should be continually visible

Procedure	Important Information
7. To initiate or increase suction drainage: • Rotate the suction control dial (A-1) to the prescribed setting (preset at - 20 cm water) • Connect the suction tubing from the wall suction to the suction port (B-4) on the chest drainage system • Adjust the wall suction regulator until the orange float appears in the suction indicator window (A-2)  figure 16	• Confirm that the orange float appears in the suction indicator window continuously when attached to suction • Higher suction levels may be ordered for patients with a large pneumothorax, empyema, thick pleural effusions, or stiff lungs
8. If multiple chest tubes and Pleur-Evacs are connected to suction, consult the Clinical Resource Nurse (PHC) or other expert resource (VCH) for assistance	• A Y-connector is required to connect multiple Pleur-Evacs to suction (not available on general units) • A double Pleur-Evac may be indicated
9. Spiral tape all connections with white cloth zinc tape or secure with nylon cable ties (if used) • Tear tape in half lengthwise, spiral taping over connections in both directions (similar to a candy cane or DNA helix) • Leave connector unobstructed to allow visualization of drainage • Tape over the ends to reinforce 	White cloth zinc tape secures connections firmly and is: • easy to tear • easy to remove • waterproof • biodegradable and disposable Waterproof tape is difficult to remove and may increase the risk of accidental chest or connecting tube disconnection.
10. Avoid dependent loops by positioning the chest drainage tubing horizontally or coiled on the bed • If dependent loops cannot be avoided, lift and drain the tubing when drainage accumulates	• Dependent or fluid-filled loops may obstruct drainage of fluid and/or air, increase intrapleural pressure and reduce effectiveness of suction
11. Maintain tubing free of kinks	• Prevents obstruction of drainage and/or air from the chest tube
12. To prevent pulling on the chest tube site, consider securing the drainage tubing to the patient's gown with a blue clamp, an elastic band and pin, or clip supplied (on Pneumostat device)	

Dressing the Insertion Site:

Equipment and Supplies:

- Dressing Tray
- Petroleum impregnated gauze
- 4 x 4 gauze and 4 x 4 drain gauze
- Mepore® Mefix ®, or other adhesive island dressing for light drainage
- Scissors

1. **With each dressing change,** assess the insertion site for:
   - Visible chest tube drainage holes
   - Presence of suture securing the chest tube
   - Kinks
   - Air leak
   - Subcutaneous emphysema
   - Signs and symptoms of infection

   If the patient has a skin reaction to the tape, dressing, or adhesive on any product, refer to the Wound Care Educator.

2. **After insertion,** cleanse around the insertion site with chlorhexidine solution, swab stick, or Solu-prep wipe
   - Apply petroleum impregnated gauze around the chest tube (to seal the insertion site)
   - Apply drain gauze around the chest tube, one above and one below the insertion site
   - Cover with 4 x 4's and Mepore® Mefix ®, or other adhesive island dressing for light drainage
   - Ensure there are no kinks or dependent loops in the drainage tubing
   - Secure the chest tube to the patient below the dressing to prevent accidental removal
   - To prevent pulling on the chest tube site, consider securing the drainage tubing to the patient's gown with a blue clamp, an elastic band and pin, or clip supplied (on Pneumostat device). See picture above

   For information about ongoing dressing changes, see
   - Patient Assessment and Interventions

Emergency Equipment:

1. Assemble **Emergency Equipment** – **Must** be with the patient at all times and accompany the patient on transport. See Policy
   - Consider using a clear plastic bag to hang from the IV pole, or re-use the plastic bag on the back of the Chest Drainage System)

Emergency Equipment List:

- 2 non-toothed forceps for each chest tube (plastic or stainless steel)

 OR 

- 250 mL bottle sterile water
- Petroleum impregnated gauze
- 4X4 gauze dressing

For information, on nursing interventions for unexpected outcomes, see Management of Potential Complications.

Patient and Family Education

Patient and Family Education	Rationale
1. Explain the procedure and how the chest drainage system works	Education may also be provided by Physiotherapy or Respiratory Therapy
2. Instruct the patient to sit upright (unless contraindicated) following procedures	Facilitates drainage from the lungs and decreases work of breathing
3. Instruct patient to change position every 2 hours keeping the tubing free of kinks	Prevents complications related to immobility and retained secretions; maintains tube patency
4. Encourage changing position in bed	Facilitates drainage of pleural effusions, if present
5. Instruct the patient to deep breathe and cough every 2 to 4 hours, splinting the affected side	Facilitates drainage, promotes lung re-expansion and prevents respiratory complications from retained secretions
6. Encourage active or passive range of motion (ROM) exercises on the affected side	Limiting movement on the effected side from discomfort at the insertion site can result in joint discomfort and potential joint contractures
7. Instruct patient on the availability of pain medication and other pain relief strategies	Patient comfort facilitates deep breathing & coughing, mobilization, range of motion and recuperation
8. Reinforce proper positioning of the chest drainage system, if appropriate.	Emphasize keeping the chest drainage system upright and below the insertion site
9. Teach the patient to call the RN immediately if they have any unusual cardiopulmonary symptoms or pain, including (not limited to): • New or increasing shortness of breath (SOB) • Coughing and/or hemoptysis (blood in sputum) • Sudden sharp, focal chest pain • Drainage or wetness on the dressing • Pain at insertion site • Sign of infection	
10. Remind patient to ask for assistance prior to mobilizing	
11. If ordered by Physician or NP, and if appropriate, teach the patient how to safely disconnect and re-connect suction tubing before and after ambulating	

Documentation

PHC:

- Chest Tube Assessment Flowsheet (PHC NF-224)
- 24 Hour Flowsheet
- Interdisciplinary Progress Notes
- Clinical Pathway document
- 24 Hour Fluid Balance Record

VCH:

- Tube/Drain Flowsheet
- Patient Care Flowsheet
- 24 Hour Fluid Balance Record
- Clinical Pathway document
- Interdisciplinary Progress Notes

Document on the Interdisciplinary Progress notes or unit specific documentation form:

- Cardiopulmonary assessment and vital signs before, during and after insertion
- Date and time of insertion
- Name of Physician inserting the chest tube
- Chest tube size
- Location of insertion site
- Description of procedure and patient tolerance
- Type of chest drainage system
- Unexpected outcomes and nursing interventions
- Presence, or absence, and trend of tidalling and bubbling in the air leak meter
- Amount, color, and characteristics of drainage
- Mark the volume of drainage on the Pleur-Evac® (or other chest drainage system) with an indelible marker, and on the fluid balance record
- Amount of suction, if ordered
- Patient and family education

Related Documents

- Chest Tubes and Chest Drainage Systems: Maintenance of the Pleur-Evac® Sahara
- Chest Tubes: Large Bore: Assisting with Removal
- Chest Tubes: Patient Assessment and Interventions: Large Bore and Percutaneous/Small Bore Chest Tubes, Chest Drainage System: Pleur-Evac® Sahara
- Chest Tubes and Chest Drainage Systems: Management of Potential Complications
- Chest Tubes: Thoracic Percutaneous Pigtail Drainage Catheter or Small Bore Chest Tube - Assisting with Insertion
- Chest Tubes: Thoracic Percutaneous Pigtail Drainage Catheter or Small Bore Chest Tube - Assisting with Removal
- Chest Tubes and Chest Drainage Systems: Heimlich Valve

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VCH: *(Regional SharePoint 2nd Reading)*
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PHC: Professional Practice Standards Committee

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