Chest Tubes: Thoracic Percutaneous Pigtail Drainage Catheter or Small Bore Chest Tube - Assisting with Removal

Site Applicability

All VCH & PHC Acute Care sites

Practice Level

Monitoring & Managing:

- **Registered Nurses (RNs)** are responsible for monitoring and managing patients with pleural percutaneous pigtail catheters (or small bore chest tubes) and chest drainage systems, with the Physician or Nurse Practitioner (NP).

Removal:

PHC: Only by a Radiologist, Thoracic or Respiratory Resident, Physician or Nurse Practitioner (NP) with expertise in removing chest tubes, assisted by a Registered Nurse

VCH: Advanced, specialized skill performed only by a Radiologist, Thoracic or Respiratory Resident, Physician.

Exception:
VGH (Cardiac Sciences (CP10 A/B), CSICU, and Chest Centre (T12)**: RNs** may remove with additional training, education and supervision in chest tube removal.

- See D-00-12-30008: Thoracic Percutaneous Pigtail Drainage Catheter (PPDC): Irrigation & Removal

Policy Statement

1. Emergency equipment stays with the patient at all times (until the percutaneous pigtail drainage catheter/ small bore chest tube is removed) and must accompany the patient on transport. See Emergency Equipment
2. 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:** D-00-07-30106 Transport for Tests/Treatment: Patient Accompaniment
3. 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 nursing assessments or interventions of the:
   - Airway and respiratory system
   - Hemodynamic and cardiopulmonary system
   - Neurological system
     - Close or constant care
     - Elopement risk; risk to self or others

Need to Know

1. The risk of infection increases for chest tubes left in over 7 days. Prompt removal improves patient mobility and lung expansion and reduces pain at the insertion site.
2. 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 Appendix A – Clamping.
3. Clamping a percutaneous pigtail drainage catheter damages the tubing lumen, occludes the catheter and complicates removal. Use the stopcock to occlude drainage on percutaneous pigtail drainage catheters. If there is no stopcock, double clamp **only** the soft end of the connecting tubing. See Appendix A – Clamping.
4. To prevent obstruction of the percutaneous pigtail drainage catheter (or small bore chest tube), potential pneumothorax and other adverse outcomes, the stopcock **must** remain open, unless ordered closed by the Physician or NP.
5. Chest tube removal is painful because the parietal pleura are very sensitive. Administer adequate analgesia at least 20 minutes before the procedure, as ordered by the Physician or NP.
6. Chest tubes are removed using strategies to reduce the risk of pneumothorax and infection, according to the preference of the Physician or NP.
7. Chest tube removal is based on resolution or improvement of indications for insertion, and includes:
    a. Improvement in respiratory assessment since insertion (e.g. Non-labored respirations less than 24 per minute, absence of shortness of breath, oxygen saturation 92% or over, decreased use of accessory muscles)
    b. If the chest tube was inserted for pleural effusion, drainage has decreased to 50 to 150 mL in 24 hours
    c. Tidaling (fluctuation) of water in the air leak meter of the Pleur-Evac® (or drainage in the drainage tubing) is minimal or absent
    d. Air leaks have resolved for at least 24 hours.
    e. The lungs have fully re-expanded (as shown on chest x-ray or ultrasound).
8. Routine chest x-ray after chest tube removal is generally not indicated. Assessment of the high risk patient and clinical symptoms are alternative methods of evaluating the need for diagnostic tests. Confirm with the Physician or NP if a post removal chest x-ray is required

Quick Links

1. Assisting with Removal: procedure
2. Post Procedure Care
3. Dressing Changes
4. Patient and Family Education
5. Documentation
6. Appendix A: Clamping
7. Appendix B: Emergency Equipment

Equipment & Supplies

- Dressing tray
- Normal saline (or other cleansing solution as ordered by Physician or NP)
- Alcohol wipes (if removing a Statlock device PHC Guideline)
- If no stopcock, 2 non-toothed forceps for each chest tube (plastic or stainless steel)

 OR 

- Petroleum impregnated gauze
- Tegaderm™ or other sterile, clear, occlusive dressing
- If ordered, sterile specimen container and sterile scissors (to send tip of chest tube to lab)
- Waterproof absorbent pads
- Personal protective equipment (gown, gloves, mask, goggles)
- Biohazardous waste bag

Procedure

Assisting with Removal

Prior to Assisting with Removal:

The assisting RN:

1. Reports coagulation tests abnormalities and medications affecting clotting factors to the Physician or NP.
2. Educates the patient and family on the chest tube removal procedure. See Patient and Family Education.
3. Performs hand hygiene before gathering equipment
4. Verifies the patient's identification as per 2 client identifier policy.
5. Ensures **patent** IV access
6. Discontinues suction momentarily (less than one minute), if ordered, See Appendix A - Clamping.
7. Assesses for an air leak or drainage volumes exceeding indications for removal. If present, confirms with the Physician or NP if appropriate to remove the chest tube. See Policy.
8. Turns suction back on, if ordered.
9. Monitors and documents vital signs, cardiopulmonary assessment (see Patient Assessment and Interventions), chest tube drainage, air leak and pain:
   - Before the procedure
   - After the procedure (see below)
10. Administers anxiolytic and/or analgesic at the appropriate time for peak effect on removal, as ordered.
11. Reassures the patient throughout the removal procedure.
12. Assists with or prepares the dressing by placing the petroleum impregnated gauze on top of the Tegaderm™ dressing (or other sterile, clear, occlusive dressing). Place on the sterile field, ready for chest tube removal.
13. Positions the patient for access to the chest tube site, or as requested by the Physician, NP. Places waterproof pads under the patient.

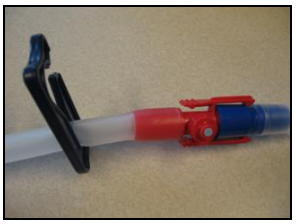
Assisting with Removal:

The Physician or NP removing the percutaneous pigtail drainage catheter:

1. Discusses the removal procedure with the patient (before administration of narcotics or sedatives)
2. Puts on personal protective equipment (PPE) and clean gloves.
3. Removes the securement device, if present. Use the alcohol wipes if removing a Statlock device PHC Guideline.
4. Removes the dressing and discards in the appropriate container.
5. Removes gloves and performs hand hygiene. Puts on new gloves.
6. Using aseptic technique, prepares the dressing tray, cleansing solution and dressings.
7. If ordered, discontinues suction. Use the stopcock to occlude drainage on the percutaneous pigtail drainage catheter (or small bore chest tube). If there is no stopcock, double clamp only the soft end of the connecting tubing. See Appendix A - Clamping.
8. Cleans the insertion site with normal saline.
9. Cleans the locking device (if present) with alcohol swabs and allows it to dry.
10. Disengages the locking device.
11. Instructs the patient on the preferred breathing procedure before removing the percutaneous pigtail drainage catheter (or small bore chest tube). See Patient and Family Education #2

The assisting RN:

12. Immediately applies the dressings to the removal site
    - Application of petroleum impregnated gauze seals the insertion site and may prevent pneumothorax
13. Verifies that the percutaneous pigtail drainage catheter/small bore chest tube was removed intact. Inform the Physician or NP immediately, if not intact.
14. If ordered, send the tip to the lab in a sterile specimen container.
15. The Physician or NP removing the percutaneous pigtail drainage catheter is responsible for safe removal of sharps.
16. Dispose of used equipment after procedure
    - Do not discard non-toothed stainless steel forceps. Return to Medical Device Reprocessing Department (MDRD) or other sterile processing department
    - Clamp the long drainage tubing of the chest drainage system near the red/blue connection site with the blue C-clamp, or tie a knot in the tubing to prevent splashing.



    - Place the entire system in a yellow biohazardous waste bag and dispose in the dirty utility or service room.
17. Remove contaminated gloves and personal protective equipment. Perform hand hygiene.
18. The Physician or NP may order a chest x-ray after removal, or as clinically indicated. See Preprinted Prescriber orders, where available.
19. Document the procedure.

Post Removal Care

Patient Assessment and Monitoring

1. Instruct the patient to stay in bed for 30 minutes after removal.
2. The RN monitors and documents vital signs, cardiopulmonary assessment, the chest tube removal site and pain:
   - Immediately post removal
   - Q1 hour x 4 and PRN
     - Look specifically for signs of respiratory distress indicating pneumothorax. Compare findings with the pre-procedure assessment. See
       - Preprinted orders (where available)
       - Patient Monitoring and Interventions #1
       - Basic skills text (electronic or hard copy), Assessment of Thorax and Lungs
3. Monitor the removal site at the same frequency as vital signs and report the following to the Physician or NP:
   - Air leak or new subcutaneous emphysema
   - Persistent drainage
   - Signs of infection
4. Instruct the patient to report to the RN immediately:
   - New or increasing shortness of breath (SOB) or chest pain
   - Coughing and/or hemoptysis (blood in sputum)
   - Sudden sharp, focal chest pain
   - Drainage or wetness on the dressing

Dressing Changes after Removal

Equipment and Supplies:

- Dressing tray
- Normal saline
- Tegaderm™ or other sterile, clear, occlusive dressing

Procedure:

1. Remove the dressing in 24 hours or PRN
   - Assess the removal site for signs of infection. If present, report to the Physician or NP
   - Discontinue the petroleum impregnated gauze (if no air leak or subcutaneous emphysema)
   - Cleanse the removal site and allow it to dry
   - Apply Tegaderm™ (or other sterile, clear, occlusive dressing) to removal site.

2. After the first dressing change, remove the dressing in 24 hours (if the removal site is healed)
   - If the patient goes home with the dressing intact, discharge instructions for removing the dressing must be given by the Physician or NP prior to discharge

Patient and Family Education

Patient and Family Education	Rationale
1. Assess patient and family knowledge of the removal procedure. Explain the procedure, reason for removal and what to expect, as requested.	Decreases anxiety and improves cooperation with the procedure. Common sensations on removal include pulling, pain, and burning.
2. Explain the patient's role in the procedure. The Physician, NP or VGH/LGH/RH RN (with additional education) removing the chest tube explains the breathing procedure to the patient, and assists in practicing prior to removal.	Chest tubes are removed using strategies to reduce the risk of pneumothorax and infection, according to the preference of the Physician or NP. Techniques to maximize intrapleural pressure during removal may include holding their breath or doing the Valsalva maneuver.
3. Instruct the patient to report to the RN immediately: • 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 • Signs of infection	Facilitates prompt interventions for treatment.
4. Instruct the patient on the availability of pain medication and other pain relief strategies	Patient comfort facilitates deep breathing & coughing, mobilization, range of motion of affected side, and recuperation
5. Instruct the patient to deep breath and cough after the percutaneous pigtail drainage catheter/small bore chest tube is removed, splinting the affected side if needed	Prevents respiratory complications from retained secretions. Splinting the affected side reduces pain.
6. If discharge is planned for the patient with the dressing in place, discharge instructions for removing the dressing must be given by the Physician or NP prior to discharge	

Documentation

PHC use:

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

VCH use:

- 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:

- Date, time and names of Physician, NP, assisting RN and VGH/LGH/RH RN (with additional education) removing the chest tube
- Location of removed percutaneous pigtail drainage catheter/small bore chest tube
- Assessments and vital signs before, during and after removal (including pain assessment)
- Description of procedures and patient tolerance
- Assessment of the removal site and dressings applied
- Specimens sent to lab, if ordered
- Medications and analgesics given
- Completion of chest x-ray, if ordered
- Any unexpected outcomes and nursing interventions
- Patient and family education

Related Documents

- Chest Tubes and Chest Drainage Systems: Maintenance of the Pleur-Evac® Sahara
- Chest Tubes: Large Bore: Assisting with Insertion
- 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 Removal
- Chest Tubes and Chest Drainage Systems: Heimlich Valve

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Developed by

CPD Developer Lead: General Nurse Educator, Professional Practice and Nursing, PHC

Other members:

Nurse Practitioner, Adult Thoracic and Lung Transplant Surgery Program, Chest Centre VGH
Respiratory Nurse Clinician Breath Program, LGH
Clinical Nurse Educator, Chest Centre VGH
Clinical Nurse Educator, Emergency, RH
Clinical Nurse Specialist, Heart Centre, PHC
Nurse Educator Cardiac Surgery Intensive Care Unit, PHC
Clinical Nurse Educator, Chest Centre, VGH
Clinical Nurse Educator, Richmond Hospital
Clinical Nurse Educator, Medicine 2South, RH
Nurse Educator, Professional Practice PHC

Consulted:

Department Head, VCH Division of Thoracic Surgery
RN, Radiology, SPH, PHC
Medical Director Medical Imaging, PHC
Department Head Medicine, PHC
Respirologist, VCH
Interventional Respirologist, PHC
Respirologist, PHC
RN, Bronchoscopy Suite, SPH, PHC

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VCH: *(Regional SharePoint 2nd Reading)*

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PHC: Professional Practice Standards Committee

Final Sign-off & Approval for Posting by

Vice President Professional Practice and Chief Clinical Information Officer, VCH

Professional Practice Standards Committee, PHC

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Appendix A: Clamping

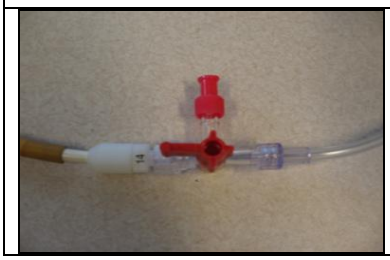
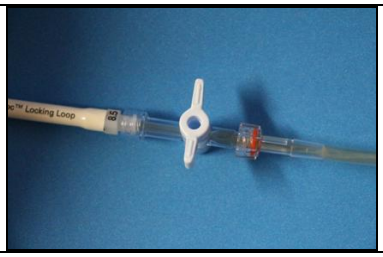
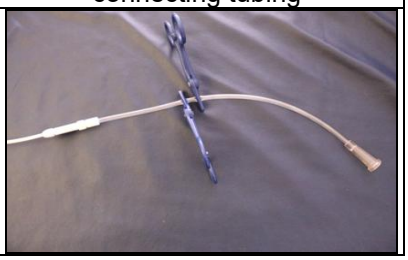
Clamping a chest tube is generally not recommended for safety reasons, but is acceptable under the supervision of Registered Nurses, Physicians or Nurse Practitioners educated in the management of chest tubes and chest drainage systems. Clamping a chest tube with a continuing air leak may lead to the potentially fatal complication of tension pneumothorax. See Need to Know

- Clamping a chest tube with a continuing air leak may lead to the potentially fatal complication of tension pneumothorax
- 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. See Management of Potential Complications #2.
- The chest tube may be clamped or the stopcock closed momentarily (less than one minute) to:
  - Lift the chest drainage system above the insertion site (to prevent backflow of drainage in tubing)
  - Locate an air leak
  - Change the chest drainage system
  - Collect a specimen
- With an order from the Physician or NP, the chest tube may be clamped (or the stopcock closed) for longer to:
  - Control initial chest tube drainage as ordered. See Drainage Collection Chamber Volumes to be expected and Preprinted Prescriber orders, where available.
  - Clamp the chest tube for a specified time after instillation of medication or sclerosing agent
  - Assess readiness for chest tube removal.
  - Evidence to support clamping chest tubes for over 2 hours is lacking, and may increase the risk of inducing a pneumothorax in patients with an air leak, or impede pleural fluid drainage

Clamping Procedures:

Equipment: 2 non-toothed forceps per chest tube (plastic or stainless steel)

1. If ordered, use the stopcock to occlude drainage on percutaneous pigtail drainage catheters/small bore chest tubes. If there is no stopcock, double clamp **only** the soft end of the connecting tubing.

Stopcock (with a port) turned off to the patient	Stopcock (without a port) closed	If no stopcock, double clamp **only** the soft end of the connecting tubing
		

   While the chest tube is clamped, observe the patient for symptoms of cardiopulmonary distress that may indicate a pneumothorax. See Patient Assessment and Interventions.
2. Teach the patient to call the RN immediately if they have any unusual cardiopulmonary symptoms or pain. See Patient and Family Education
3. If symptoms of cardiopulmonary distress occur, open the stopcock immediately (or remove the clamps). Monitor the patient and notify the Physician or NP (or call a code). See Management of Potential Complications #2.

Appendix B: Emergency Equipment

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
   - 4 x 4 gauze dressing

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