Chest Tubes: Large Bore - Assisting with Removal

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

1. Chest tube removal is a Physician or Nurse Practitioner (NP) responsibility, except when the skill is within the competency list of unit/program, and after education from a Nurse Educator or delegate. See

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

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

2. Emergency equipment stays with the patient at all times (until the chest tube is removed) and must accompany the patient on transport. See Emergency Equipment

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

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. Chest tube removal is painful because the parietal pleurae are very sensitive. Administer adequate analgesia at least 20 minutes before the procedure, as ordered. The Physician or Nurse Practitioner may opt to inject local anesthetic into the chest tube tract.

3. Chest tubes are removed using strategies to reduce the risk of pneumothorax and infection, according to the preference of the Physician or Nurse Practitioner.
4. 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).
5. The Physician or Nurse Practitioner may order clamping of the chest tube to assess readiness for removal. See Appendix A: Clamping.
6. Chest tube removal is based on resolution or improvement of indications for insertion, and includes:
   - 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).
   - If the chest tube was inserted for hemothorax, empyema, or pleural effusion, drainage has decreased to 50 to 100 mL in 24 hours.
   - Drainage has changed from sanguinous to serosanguinous.
   - Tidaling (fluctuation) of water in the small arm of the air leak meter of the Pleur-Evac® (or drainage in the drainage tubing) is minimal or absent.
   - Air leaks have resolved for at least 24 hours.
   - The lungs have fully re-expanded (as shown on chest x-ray or ultrasound).

- 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 Nurse Practitioner if a post removal chest x-ray is required.

Quick Links

Equipment & Supplies

- Dressing tray
- Normal Saline (or other cleansing solution as ordered by Physician or NP)
- Sterile suture scissors or stitch cutter
- Petroleum impregnated gauze
- Sterile 4 x 4 gauze (in the dressing tray)
- Mepore®, Mefix® or other adhesive island dressing for light drainage)
- 2 non-toothed forceps for each chest tube (plastic or stainless steel)

 OR 

- 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)

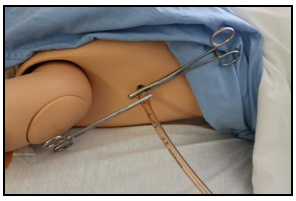
- Biohazardous waste bag

Procedure

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. Puts on personal protective equipment (PPE).
5. Verifies the patient's identification as per 2 client identifier policy.
6. Ensures **patent** IV access.
7. Assesses for air leak or drainage volumes exceeding indications for removal. See Policy. Confirm with the Physician or NP if appropriate to remove the chest tube.
8. Administers analgesic and/or anxiolytic at the appropriate time for peak effect on removal, as ordered.
9. Positions the patient for access to the chest tube site, or as requested by the Physician or NP. Place waterproof pads under the patient.
10. If ordered by the Physician or NP, discontinues suction.
11. The RN monitors and documents vital signs, cardiopulmonary assessment (See Patient Assessment & Interventions) chest tube drainage, air leak and pain:
    - Before the procedure
    - Continuous (automated) pulse, blood pressure and pulse oximetry monitoring every 5 minutes during the procedure
    - After the procedure (see below)
12. If ordered by the Physician, use 2 non-toothed forceps to double clamp the chest tube in opposite directions, close to the insertion site (to completely occlude the chest tube). See Appendix A – Clamping.



13. Reassure the patient throughout the removal procedure.
14. Assist with or prepare the dressing by placing the petroleum impregnated gauze on top of the sterile 4 x 4 gauze. Place on the sterile field, ready for chest tube removal.
15. Assist in removal, or remove securement device (if present), tape and chest tube dressings. Discard in the appropriate container.
16. Remove contaminated gloves and perform hand hygiene. Put on clean gloves.
17. The Physician or NP removes the chest tube. See

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

    PHC: NCS5431: Chest Tube Removal Post Cardiac Surgery (CSICU)
    - See Need to Know (# 3) or Patient and Family Education # 2
18. Verify that the chest tube was removed intact. Inform the Physician or NP immediately if not intact.
19. The Physician or NP closes the wound firmly with a suture.
    - To ease suture removal and prevent skin necrosis, avoid closing the suture line tightly
    - Close the removal site with adhesive skin closure strips PRN

20. The assisting RN immediately applies the petroleum impregnated and 4 x 4 gauze to the removal site. Cover with Mepore®, Mefix ®,or other adhesive island dressing for light drainage.
    - Application of petroleum impregnated gauze seals the insertion site and may prevent pneumothorax
    - Continued use of petroleum impregnated gauze causes skin maceration, increases the risk of infection, and may alter the integrity of the sutures
21. Request suture removal orders from the Physician or NP (usually in 3 days).
22. If ordered, send the tip of the chest tube to the lab in a sterile specimen container.
23. Dispose of used equipment after procedure.
    - The Physician, or NP removing the chest tube is responsible for safe removal of sharps
    - 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 with the blue C-clamp, or tie a knot in the tubing (to prevent splashing). See Appendix A - Clamping
    - Place the entire system in a yellow biohazardous waste bag in the dirty utility or service room.
24. Remove contaminated gloves and personal protective equipment (PPE). Perform hand hygiene.
25. The Physician or NP may order a chest x-ray after removal, or as clinically indicated. See Preprinted Prescriber orders, where available.
26. Document the procedure.

Post Removal Care:

Patient Assessment and Interventions:

1. Instruct the patient to stay in bed for 30 minutes after chest tube removal.
2. The RN monitors and documents vital signs, cardiopulmonary assessment, the chest tube 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 Assessment 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
- Petroleum impregnated gauze
- Sterile 4 x 4 gauze (in the dressing tray)
- Sterile Mepore®, Mefix®, or other adhesive island dressing for light drainage
- Sterile suture scissors or stitch cutter (when removing sutures)

1. Change the dressing in 24 hours or PRN
   - Assess the incision for signs of skin necrosis and 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 new dressing

2. After the first dressing change, remove the dressing 24 hours later.
   - If the incision is dry, approximated and healed, with an order from the Physician or NP, the chest tube sutures may be removed.
   - If the patient goes home with sutures intact, discharge instructions for suture removal must be made 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 or NP 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 breathe and cough after the chest tube is removed, splinting the affected side	Prevents respiratory complications from retained secretions. Splinting the affected side reduces pain.
6. If discharge is planned for the patient with the sutures or dressings in place, discuss the plan for removal with the Physician or NP before they leave	Sutures left in place for over 7 days may embed in the skin, increasing the risk of discomfort, infection, or skin necrosis

Site Specific Practices

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

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

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:

- Date, time and names of clinician removing the chest tube
- Location of removed chest tube
- Assessments and vital signs before, during and after removal (including pain assessment).
- Description of procedure and patient tolerance
- Assessment of removal site and dressings applied
- Description of sutures (and if they were cut or tied)
- 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: 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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- Health Authority & Area Specific Interprofessional Advisory Council Chairs (HAIAC)
- Operations Directors
- Professional Practice Directors

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 a Chest Tube

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 chest tubes requires a Physician or NP order and is generally contraindicated. Clamping a chest tube with an air leak may lead to the potentially fatal complication of tension pneumothorax. See Need to Know.

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 (except in the situations listed below). 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 tube drainage
- Collect a specimen

With an order from the Physician or NP, the chest tube may be clamped for longer to:

- Control initial chest tube drainage as ordered. See Drainage Collection Chamber Volumes 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

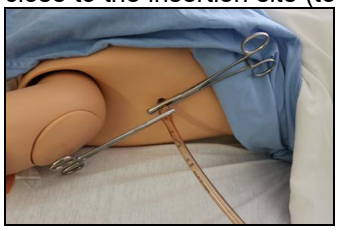
Clamping Procedure:

Equipment:

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


OR


1. If ordered, use 2 non-toothed forceps to double clamp a large bore chest tube in opposite directions, close to the insertion site (to completely occlude the chest tube).



2. While the chest tube is clamped, observe the patient for symptoms of cardiopulmonary distress that may indicate development of a pneumothorax. See
   - Preprinted orders (where available)
   - Patient Assessment and Interventions #1
   - Basic skills text (electronic or hard copy), Assessment of Thorax and Lungs
3. Teach the patient to call the RN immediately if they have any unusual cardiopulmonary symptoms or pain. See Patient and Family Education.
4. If symptoms of cardiopulmonary distress occur, remove the clamps immediately, monitor the patient and notify the Physician or NP (or call a code). See Management of Potential Complications # 2.

Appendix B: Emergency Equipment

1. Assemble **Emergency Equipment** (if not already done) – **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 (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.