

Chest Tubes and Chest Drainage Systems: Maintenance of the 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

- Emergency equipment stays with the patient at all times and must accompany the patient on transport. See [Emergency Equipment](#).
- Use aseptic technique when accessing chest tubes, chest drainage systems, or insertion sites.
- 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 Test/Treatments: Patient Accompaniment](#)

- 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
- 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](#)
- PHC & Richmond Hospital:** Irrigation of chest tubes is a Physician or Nurse Practitioner responsibility, except when the skill is within the competency list of the unit/program, and after education from a Nurse Educator or delegate.
VCH: See D-00-12-30008: [Thoracic Percutaneous Pigtail Catheter \(PPDC\): Irrigation & Removal](#)
- Chest tube removal is a Physician or NP 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: LGH & VGH only: D-00-12-30007: [Pleural Chest Tube Removal](#)

Need to Know

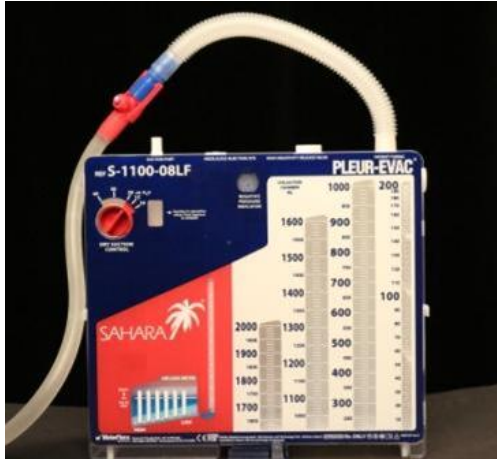
1. An order is required from a Physician or Nurse Practitioner (NP) to apply or discontinue suction to a chest tube. See Preprinted Prescriber Orders where available
2. Chest tubes must be attached to an approved chest drainage system. Consult with the Physician or NP before changing another system to a Pleur-Evac® or other approved chest drainage system. See [changing the chest drainage system #5](#).
3. 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 [Clamping](#))
4. 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.
5. Do not clamp a chest tube (or close the stopcock on a percutaneous pigtail drainage catheter/small bore chest tube) during transport or while mobilizing, unless specifically ordered by the Physician or NP.
6. To prevent obstruction of a percutaneous pigtail drainage catheter (PPDC)/small bore chest tube, potential pneumothorax and other adverse outcomes, the stopcock **must** remain open, unless ordered closed by the Physician or NP.
7. 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. [Emergency Equipment](#)
2. [Clamping](#)
3. [Milking](#)
4. [Specimen Collection](#)
5. [Changing the Chest Drainage System](#)
6. [Disposal of the Chest Drainage System](#)
7. [Patient and Family Education](#)
8. [Documentation](#)

Practice Guideline

Maintenance of the Pleur-Evac Sahara



1. Emergency Equipment

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 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.

2. Clamping

Clamping chest tubes 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 a 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 (except in the situations listed below). See [Management of Potential Complications #2](#).

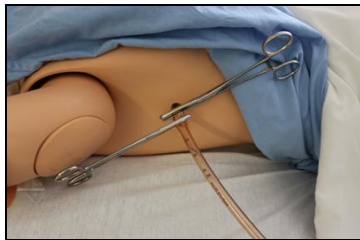
Note: This is a **controlled** document for VCH & PHC internal use. Any documents appearing in paper form should always be checked against the electronic version prior to use. The electronic version is always the current version.

- 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](#) 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

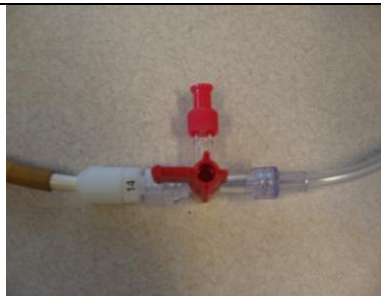
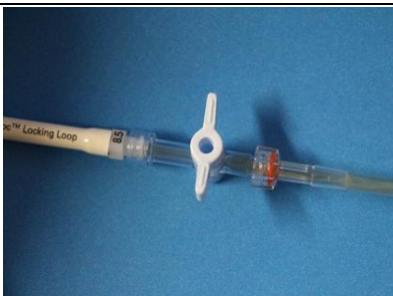
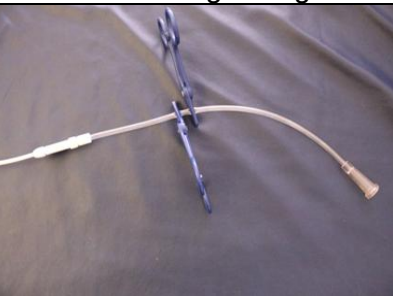
Clamping Procedures:

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

1. If ordered, use 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. 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** on 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
		

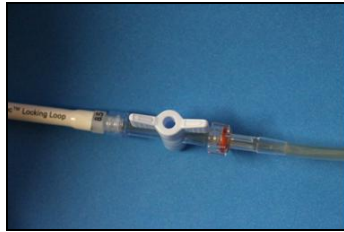
3. While the chest tube is clamped, observe the patient for symptoms of cardiopulmonary distress that may indicate a pneumothorax. See [Patient Assessment and Interventions #1](#)
4. Teach the patient to call the RN immediately if they have any unusual cardiopulmonary symptoms or pain. See [Patient Assessment and Interventions #1](#)
5. If symptoms of cardiopulmonary distress occur, remove the clamps (or open the stopcock) immediately. Monitor the patient and notify the Physician or NP (or call a code). See [Management of Potential Complications # 2](#).

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3. Milking

Milking requires an order from the Physician or NP. Milking is defined as manual squeezing and releasing of the chest tube and/or drainage tubing. Routine milking of chest tubes creates excess negative pressure and is not recommended. See [Need to Know](#).

If the Physician or NP orders milking, ensure there are no clamps on the chest tube (or the stopcock is open on a percutaneous pigtail drainage catheter/small bore chest tube) before the procedure.



- Assess and identify the blood clot or drainage/tissue obstructing the chest tube
- Milk gently by sequentially squeezing and releasing short segments of the chest tube and tubing
- Evaluate the effect of the intervention

Stripping to dislodge a clot or other drainage is contraindicated. This practice can cause excess negative intrapleural pressure with potential entrapment of lung tissue and increased bleeding.

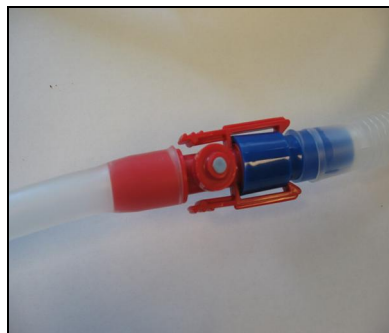
4. Collecting a Specimen

Collecting a specimen requires an order from the Physician or NP. The optimal time to collect specimens is during insertion. Collect specimens from the needleless sample port only. Do **not** collect specimens from the drainage tubing, it is not self sealing.

Equipment List:


- Personal protective equipment (PPE)
- Alcohol swabs
- Clean gloves
- 10 mL luer lock syringe
- 2 non-toothed forceps (plastic or stainless steel)
- Specimen container
- Patient label and requisition

Collecting a Specimen from the Sample port



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Procedure:

Collecting a Specimen	
1.	Perform hand hygiene. Use aseptic technique during procedure.
2.	Verify the patient's identification as per 2 client identifier policy.
3.	Put on personal protective equipment (PPE)
4.	If suction is ordered, turn off momentarily (less than 1 minute).
5.	<p>Percutaneous Pigtail Drainage Catheter/Small Bore Chest Tube:</p> <ul style="list-style-type: none"> Use the stopcock to occlude drainage on percutaneous pigtail drainage catheters/small bore chest tubes Form a dependent loop of tubing to collect drainage close to the sample port Close or turn the stopcock off to the patient momentarily (less than one minute). If there is no stopcock, double clamp only the soft end of the connecting tubing. See Clamping. For the rest of the procedure, see directions for a large bore chest tube below After the specimen is collected, open the stopcock or remove the clamps  <ul style="list-style-type: none"> Turn the suction back on, if ordered
6.	<p>Large Bore Chest Tube</p> <ul style="list-style-type: none"> Form a dependent loop of tubing to collect drainage close to the sample port. Clamp momentarily (less than one minute), if necessary. See Clamping Cleanse the sample port vigorously for 15 seconds (at minimum) with an alcohol swab. Allow to dry Attach a 10 mL luer lock syringe to the sample port Slowly aspirate the specimen Remove the syringe and transfer contents into the appropriate specimen container Cleanse the sample port vigorously for 15 seconds (at minimum) with an alcohol swab. Allow to dry Remove clamps, if present, and turn suction back on, if ordered Transfer the specimen into the appropriate container. Label the specimen container and send to the lab with the appropriate requisition

5. Changing the Chest Drainage System

Change the chest drainage system when:

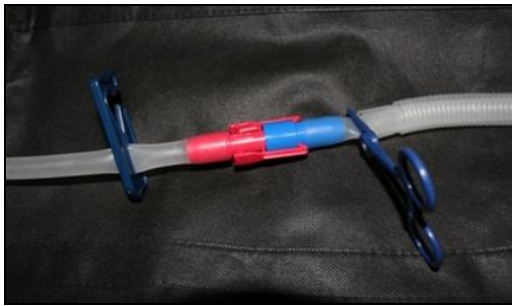
- The collection chamber is almost full
- A suspected malfunction or leak in the system is unresolved with nursing interventions
- Every 7 days and PRN (with new purulent or cloudy drainage)

Equipment:

- Pleur-Evac® Sahara
- Alcohol swabs
- Personal protective equipment (PPE)
- Biohazardous waste bag
- White cloth zinc tape, or nylon cable ties (if used)
- 2 non-toothed forceps (plastic or stainless steel)

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Procedure:

Changing the Chest Drainage System	
1.	Perform hand hygiene. Use aseptic technique during procedure
2.	Put on personal protective equipment (PPE)
3.	Prepare a new chest drainage system as per instructions in the package and Assisting with Large Bore Chest Tube Insertion (Setting up the Pleur-Evac®) or Assisting with Insertion of Percutaneous Pigtail Drainage Catheter/Small Bore Chest Tube (Appendix A) .
4.	Disconnect the long drainage tubing on the new chest drainage system at the red/blue connection site, while maintaining sterility of the system
5.	Take the new chest drainage system to the patient's location (without the long drainage tubing)
6.	If suction is ordered, turn off momentarily (less than 1 minute)
7.	Percutaneous Pigtail Drainage Catheter (PPDC)/Small Bore Chest Tube: <ul style="list-style-type: none"> Use the stopcock to occlude drainage. If there is no stopcock, double clamp only the soft end of the connecting tubing. Close or turn the stopcock off to the patient. See Clamping
8.	Large Bore Chest Tube <ul style="list-style-type: none"> Use 2 non-toothed forceps to double clamp the chest tube in opposite directions, close to the insertion site. See Clamping
9.	Clamp the drainage tubing of the full chest drainage system near the red/blue connection site with the C-clamp. Slide the corrugated tubing back from the blue connection site to expose the inner tubing. Clamp the tubing to prevent fluid splashing on disconnection and disposal.
	
10.	Disconnect the full chest drainage system at the red/blue connection site.
11.	Replace with the new chest drainage system, while maintaining sterility.
12.	Open the C-clamp and place it away from the patient (to prevent accidental closure).
13.	Percutaneous Pigtail Drainage Catheter (PPDC) / Small Bore Chest Tube: <ul style="list-style-type: none"> Open the stopcock (if present) or remove the clamps on the soft connecting tubing
14.	Large Bore Chest Tube <ul style="list-style-type: none"> Remove the non-toothed forceps on the chest tube
15.	Turn the suction back on, if ordered

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16. Ensure all connections are secured or taped. Waterproof tape is difficult to remove and may increase the risk of accidental disconnection.

- Spiral tape all connections with white cloth zinc tape (PeopleSoft #00023539) 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



17. 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)



6. Disposal of the Chest Drainage System

- The Pleur-Evac® Sahara and most other chest drainage systems are single-use items. Do not drain the contents
- Wear personal protective equipment (PPE) and use standard precautions
- 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).
- Place the entire system in a yellow biohazardous waste bag and dispose in the dirty utility or service room.
- Remove contaminated gloves and personal protective equipment. Perform hand hygiene.

Patient and Family Education

Patient and Family Education	Rationale
1. Explain how the chest drainage system works	Education may also be provided by Physiotherapy or Respiratory Therapy
2. Instruct the patient to change position every 2 hours, keeping the tubing free of kinks	Prevents complications related to immobility and retained secretions and maintains tube patency
3. Encourage changing position in bed	Facilitates drainage of pleural effusions, if present
4. Instruct the patient to deep breath and cough every 2 to 4 hours, splinting the affected side	Facilitates drainage, promotes lung re-expansion and prevents respiratory complications related to retained secretions
5. Encourage active or passive range of motion (ROM) exercises on the affected side	Limiting movement on the effected side due to discomfort at the insertion site can result in joint discomfort and potential joint contractures
6. Instruct patient on the availability of pain medication and other pain relief strategies	Patient comfort facilitates deep breathing & coughing, mobilization, range of motion (ROM) and recuperation
7. Reinforce proper positioning of the chest drainage system, if appropriate.	Emphasize keeping the chest drainage system upright and below chest level
8. Teach patient to call the RN immediately if they have any unusual cardiopulmonary symptoms or pain, including (not limited to): <ul style="list-style-type: none"> New or increasing shortness of breath (SOB) Coughing and/or hemoptysis (blood in sputum) Sudden sharp, focal chest pain Pain at insertion site Drainage or wetness on the dressing Signs of infection 	
9. Remind patient to ask for assistance prior to mobilizing	
10. 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, and with changes in treatment. See Patient Assessment and Interventions.
- Date and time of procedures or interventions with the chest tube or chest drainage system, and patient tolerance
- Location of insertion site
- Size of percutaneous pigtail drainage catheter/large or small bore chest tube
- Type of chest drainage system
- Unexpected outcomes and nursing interventions
- Amount, color, and characteristics of drainage
- Presence, absence and trend of tidalling and bubbling in the air leak meter (with a chest drainage system)
- Mark the volume of drainage on the Pleur-Evac® (with an indelible marker) and the fluid balance record
- Amount of suction, if ordered
- Patient and family education

Related Documents

- [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 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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 Respiratory Nurse Clinician Breath Program, LGH
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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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July 22, 2021 – Add requirement for RN to accompany patient is chest tube inserted <24 hours