Chest Tubes: Heimlich Valve

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. To prevent obstruction, potential pneumothorax and other adverse outcomes, do not occlude the distal end of the Heimlich valve. Occlusion can cause accumulation of air within the pleural space, preventing resolution and/or exacerbating a pneumothorax.
2. Suction is never applied to a Heimlich valve.
3. A urinary drainage bag is not acceptable for use as a chest drainage system.
4. Emergency equipment stays with the patient at all times and must accompany the patient on transport. See Emergency Equipment
5. Use aseptic technique when accessing chest tubes, chest drainage systems, or insertion sites.
6. 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
7. Patients with pleural chest tubes leaving the unit for diagnostic tests or treatments are accompanied by an RN (or have tests done portably) with clinical conditions that require frequent nursing assessments or interventions of the:
   - Airway and respiratory system e.g. Large or new pneumothorax on chest x-ray
   - Hemodynamic and cardiopulmonary system
   - Neurological system
     - Close or constant care
     - Elopement risk; risk to self or others

Need to Know

1. The Heimlich valve is a disposable, one-way rubber flutter valve, encased in a hard plastic tube that is attached to a chest tube. The one-way valve allows air to exit and prevents it from re-entering the pleural space. The Heimlich valve is used only for evacuation of air, not fluid.
2. The Heimlich valve is indicated for use in patients with a pneumothorax and less than 50 mL fluid drainage over 24 hours. The risk of obstructing the flutter valves increases with excess drainage.
3. A Physician or NP order is required to attach a Heimlich valve to a chest tube.
4. If suction or fluid drainage is required, change the Heimlich valve to a Pleur-Evac®, or other approved chest drainage system, as ordered by the Physician or NP. See Converting a Heimlich valve to a Pleur-Evac®
5. If there is a significant amount of drainage from the Heimlich valve, consider requesting a Physician or NP order to convert to a Pleur-Evac® (or other chest drainage system).

VCH: see D-00-12-30074: Pneumostat Chest Drain Valve – Management in Acute Care

6. 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 (in a chest drainage system) 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).
7. 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.
8. 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.

Quick Links

1. Assessment and care of the patient with a Heimlich valve
2. Emergency equipment
3. Replacing a Heimlich valve
4. Converting a Heimlich valve to a Pleur-Evac® chest drainage system
5. Converting a Pleur-Evac® chest drainage system to a Heimlich valve
6. Patient and Family education
7. Documentation

For information on chest tube insertion procedures, equipment, and dressings, see:

- Thoracic Percutaneous Pigtail Drainage Catheter or Small Bore Chest Tubes – Assisting with Insertion
- Patient Assessment and Interventions

Procedure

Assessment and Care of the Patient with a Heimlich Valve

1. Complete and document a baseline cardiopulmonary assessment, including assessing for subcutaneous emphysema. See
   - Patient Assessment and Interventions
   - Basic skills text (electronic or hard copy), Assessment of Thorax and Lungs
2. Ensure the Heimlich valve is connected to the chest tube correctly. The blue end is attached to the chest tube; the clear distal end vents air and must remain open at all times
   - The arrow on the side of the device points away from the patient. If attached incorrectly, the valve will block air flow out of the chest tube, exacerbating or causing a pneumothorax.

   - Ensure the distal end of the Heimlich valve is open and free of any potential obstructions, such as clothing or bed sheets

3. Assess and document valve movement with each patient assessment. During exhalation the walls of the rubber valve open to allow air to escape, then close during inhalation. Sound may be heard from air exiting the valve on exhalation.
   - Valve movement – indicates normal valve function when air exits the pleural space. Slight movement or vibrations may continue after resolution of the pneumothorax due to normal intrathoracic pressure changes with respiration
   - No valve movement – indicates the pneumothorax may have resolved, or an obstruction/disconnection of the chest tube, connecting tubing or valve.
   - Assess cardiopulmonary systems, valve movement and vital signs:
     a. Post insertion
        i. Q15 min x 2
        ii. In 30 min x1
        iii. Q1 hour x 4
     b. Ongoing assessment
        i. For the first 24 hours, Q4 hours and PRN
        ii. After 24 hours; every 6 hours and PRN, or as ordered

     See Preprinted orders (where available) and Patient Assessment and Interventions
4. If valve not fluttering and remains unresolved after nursing interventions, report to the Physician or NP. See Management of Potential Complications.
5. Assess pain/comfort level using approved pain scale Q4H and PRN
6. Apply the appropriate dressing for the type of chest tube. See Patient Assessment and Interventions.
7. 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 the connector and flutter valve unobstructed by tape (to assess valve fluttering)
   - Tape over the proximal end to reinforce

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

   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
   - Heimlich valve (for replacement if disconnected from chest tube. See below for ordering process).

Replacing a Heimlich Valve:

If the Heimlich valve requires replacement, order a new one from Epro: Heimlich valve Vendor Item ID G36370, or

PHC/VA: Call Radiology. The replacement valve is charged to the unit cost centre.

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

Converting a Heimlich Valve to a Pleur-Evac® Chest Drainage System

Equipment List:

- Pleur-Evac® or other approved chest drainage system (if connecting to drainage)
- Appropriate size Statlock Fixation device PHC Guideline for size of percutaneous pigtail drainage catheter/chest tube (if required)

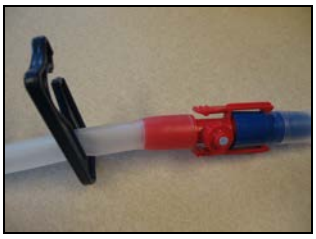
1. Confirm there is a Physician or NP order to convert the Heimlich valve to a Pleur-Evac® chest drainage system.
2. Verify the patient's identification as per 2 client identifier policy.
3. Perform hand hygiene and put on personal protective equipment (PPE).
4. Set up the Pleur-Evac®. See Large Bore Chest Tube – Assisting with Insertion
5. Position and prepare the patient.
6. Remove tape or nylon ties securing the chest tube.
7. Ask the patient to exhale and hold their breath.
   - Do **not** clamp a percutaneous pigtail drainage catheter, use the stopcock. See Need to Know
   - Clamp the large bore chest tube or turn the stopcock on the percutaneous pigtail drainage catheter/small bore chest tube off to the patient momentarily (less than one minute).
8. Using aseptic technique, support the chest tube in one hand and remove the Heimlich valve with the other hand.
9. Keeping both ends sterile, attach the Pleur-Evac® drainage tube to the chest tube.
10. Unclamp the chest tube or open the stopcock to the patient and chest drainage system. Ask the patient to breathe normally.
11. Spiral tape all connections with white cloth zinc tape or secure with nylon cable ties (if used).
12. Dispose of the Heimlich valve in the biohazardous waste container.
13. Remove personal protective equipment (PPE) and perform hand hygiene.
14. For information on assessment, see
    - Preprinted Orders (where available)
    - Patient Assessment and Interventions
    - Basic skills text (electronic or hard copy), Assessment of Thorax and Lungs

Converting a Pleur-Evac® Chest Drainage System to a Heimlich Valve

Emergency & Supplies

- Replacement Heimlich valve (Vendor Item ID G36370)
- **PHC:** Appropriate size Statlock Fixation device PHC Guideline for size of percutaneous pigtail drainage catheter/small bore chest tube (if required)

1. Confirm there is an order to convert Pleur-Evac® chest drainage system to a Heimlich valve.
2. Verify the patient's identification as per 2 client identifier policy.
3. Perform hand hygiene and put on personal protective equipment (PPE).
4. Position and prepare the patient.
5. Turn off and disconnect suction, if used.
6. Remove tape or nylon ties securing the chest tube.
7. Ask the patient to exhale and hold their breath
   - Do **not** clamp a percutaneous pigtail drainage catheter, use the stopcock
   - Clamp the large bore chest tube or turn the stopcock on the percutaneous pigtail drainage catheter/small bore chest tube off to the patient momentarily (less than one minute)
   - See Need to Know and Appendix A - Clamping
8. Using aseptic technique, support the chest tube in one hand and disconnect the Pleur-Evac® drainage tubing with the other hand.
9. Keeping both ends sterile, attach the blue end of the Heimlich valve to the chest tube, with the arrow pointing **away** from the patient. Attaching the valve incorrectly may cause a recurrence or new pneumothorax. See picture
10. Unclamp the chest tube or open the stopcock to the patient and chest drainage system. Ask the patient to breathe normally.
11. 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.



12. Spiral tape all connections with white cloth zinc tape or secure with nylon cable ties (if used).
13. Place the chest drainage system in a yellow biohazardous waste bag in the dirty utility or service room.
14. Remove personal protective equipment (PPE) and perform hand hygiene.

Converting a Heimlich Valve to a Pneumostat Chest Drain **(VGH & Coastal only)**

- See Pneumostat Chest Drain Valve – Management in Acute Care

Patient and Family Education:

Patient and Family Education	Rationale
1. Explain the procedures and purpose of the chest tube and the Heimlich valve.	
2. Ensure the patient understands not to kink or occlude the chest tube.	
3. Reinforce the correct position of the chest drainage system and that the stopcock **must** remain open (unless ordered closed)	Emphasize keeping the chest drainage system upright and below chest level and the percutaneous pigtail drainage catheter/small bore chest tube stopcock open.
4. Explain that the patient may hear air flow and see the Heimlich valve fluttering.	
5. Ensure the patient understands that the distal end of the Heimlich valve must remain open and free of any potential obstructions, such as clothing or bed sheets.	
6. Teach the patient to inform the RN if the Heimlich valve stops fluttering or they can't hear air flow, if appropriate.	
7. Instruct patient to sit upright (unless contraindicated) following procedure.	Facilitates drainage from the lungs and aides in ease of breathing
8. 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
9. Encourage changing position in bed.	Prevents complications related to immobility and retained secretions
10. 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
11. Encourage active or passive range of motion (ROM) exercises on the affected side.	Limiting movement on the affected side due to discomfort at the insertion site can result in joint discomfort and potential joint contractures
12. Instruct the patient on the availability of pain medication and other pain relief strategies	Patient comfort facilitates deep breathing & coughing, mobilization, ROM and recuperation
13. 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 • Signs of infection	

14. If the patient is discharged with the Heimlich valve, provide and document *written* discharge instructions with the relevant information above, and including (not limited to):
    - Seek prompt medical attention if new or increasing shortness of breath (SOB), chest pain, or other respiratory symptoms listed above
    - Ensure the patient has access to a health care provider in the case of emergency or unusual respiratory symptoms. Consult home or community care if needed and as ordered
    - Reinforce the importance of not kinking or occluding the chest tube, keeping the stopcock on the percutaneous pigtail drainage catheter/small bore chest tube open and the distal end of the Heimlich valve free of any potential obstructions
    - Stress the importance of keeping the connections tight and the dressing site dray and intact
    - Assess valve fluttering. If the valve stops fluttering and airflow stops, teach the patient to check and tighten connections. Advise the patient to contact community resources, their Physician or NP, or go to Emergency
    - Change the dressing
    - Recognize the signs of wound infection
    - Ensure the patient has the capability and resources to care for the Heimlich valve and change the dressing

Site Specific Practices

VCH: VGH & Coastal only: Pneumostat Chest Drain Valve – Management in Acute Care

Documentation

PHC:
- Chest Tube Assessment Flowsheet (PHC NF-224)
- 24 Hour Flowsheet (except in Critical Care)
- 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 and after insertion or application of Heimlich valve
- Date and time of insertion of chest tube or application of Heimlich valve
- Name of Physician or NP inserting the chest tube or applying the Heimlich valve; or the RN converting the Heimlich valve
- Description of procedures or interventions and patient tolerance
- Location of insertion site
- Size of percutaneous pigtail drainage catheter/large or small bore chest tube
- Type of drainage system or Heimlich valve
- Unexpected outcomes and nursing interventions
- Presence or absence of valve fluttering in the Heimlich valve
- Amount, color, and characteristics of drainage, if any
- 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 Insertion
- Chest Tubes: Thoracic Percutaneous Pigtail Drainage Catheter or Small Bore Chest Tube - Assisting with Removal

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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 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

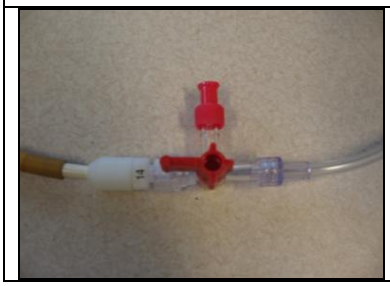
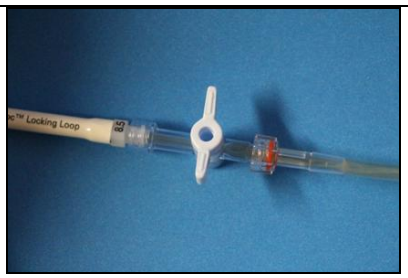
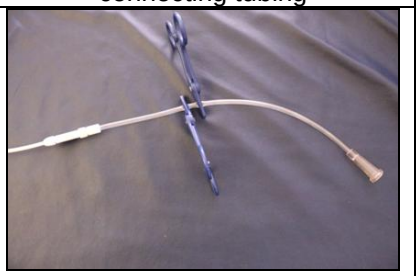
- Clamping a chest tube with a continuing air leak may lead to the potentially fatal complication of tension pneumothorax
- Before clamping, assess the patient and chest drainage system for an air leak. If there is bubbling in the air leak meter with deep breathing or coughing, do **not** clamp the chest tube. Notify the Physician or NP for an order, except in the situations listed below. See Management of Potential Complications #2.
- 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)
  - Change the Heimlich valve to another approved chest drainage system
  - Collect a specimen
  - 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. 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
		

2. 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.
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, 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.