GMHA
NURSING SERVICES DEPARTMENT

Guidelines for Care:
Management of Patients with a Chest Drainage Unit

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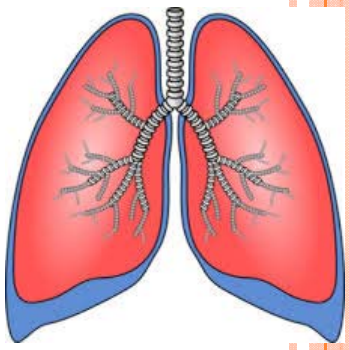
OBJECTIVES:



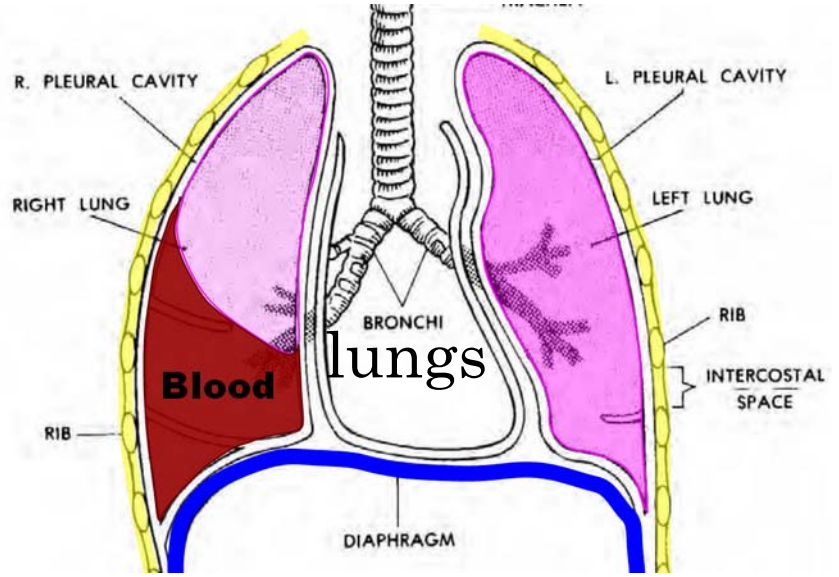
1. Identify the indications, contraindications, and risks associated with the use of a Chest tube/Chest Drainage Unit.
2. Identify and be familiar with the Chest Drainage Units available in your designated unit.
3. Recall basic principles of the Chest Drainage Units (CDUs).
4. Recall Nursing Staff roles/responsibilities for patients with a chest tube and Chest Drainage Unit.
5. Recall special considerations and KEY POINTS while patient is on a Chest Drainage Unit.
6. Review *GMHA Policy and Procedure 6353-11-H-14: Care of a Patient with a Thoracic Drainage System* and *6313-II-51.00: Care of the patient with Chest Tubes*

WHAT ARE INDICATIONS FOR A PATIENT WITH A CHEST TUBE DRAINAGE SYSTEM?

- **A Chest Drainage Unit (CDU)** (also known as the Thoracic drainage system) is a device that is connected to a tube that is inserted into the pleural space of the chest to evacuate air or fluid and/or help regain negative pressure.

1. During or immediately after thoracic surgery, chest tubes are positioned strategically in the pleural space, sutured to the skin, and connected to the CDU to remove the residual air, and fluid from the pleural or mediastinal space.
2. CDUs are also inserted to treat spontaneous pneumothorax or hemothorax/pneumothorax caused by trauma.

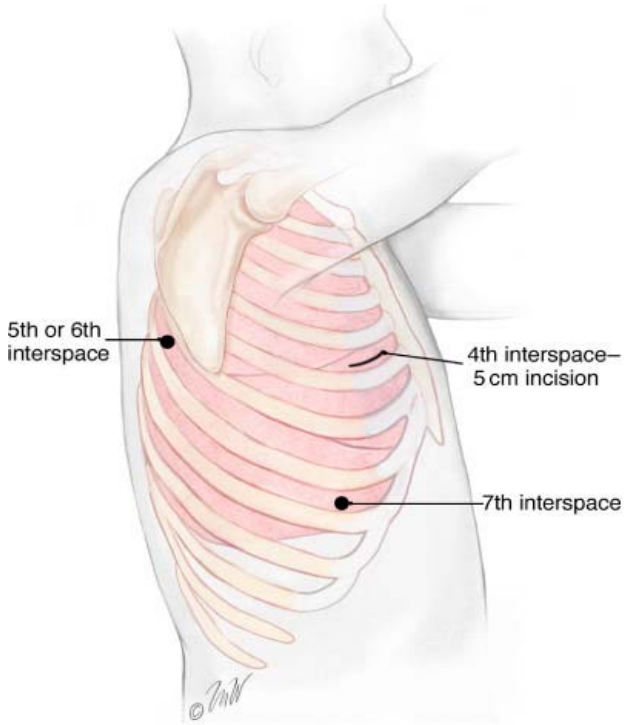
INDICATIONS CONTINUED…



3. CDUs help drain substances that may accumulate in the lungs such as:
   - AIR- Pnuemothorax
   - BLOOD- Hemothorax
   - FLUID- Pleural effusion
   - LYMPHATIC FLUID- Chylothorax
   - PUS- Emphyema
   - This collection of air, fluid, or other substances in the thoracic cavity can compromise cardiopulmonary function and cause collapse of the lung.
4. Need for pleurodesis: A procedure used to treat patient with recurrent pleural effusions or recurrent pneumothorax.
5. Chemotherapy administration

CHEST TUBE PLACEMENT:

- Site for chest tube placement include:
  - For pneumothorax (air)– 2nd or 3rd interspace along midclavicular or 4th intercostal space anterior axillary.
  - For hemothorax (fluid)– 6th or 7th lateral interspace in the midaxillary line.



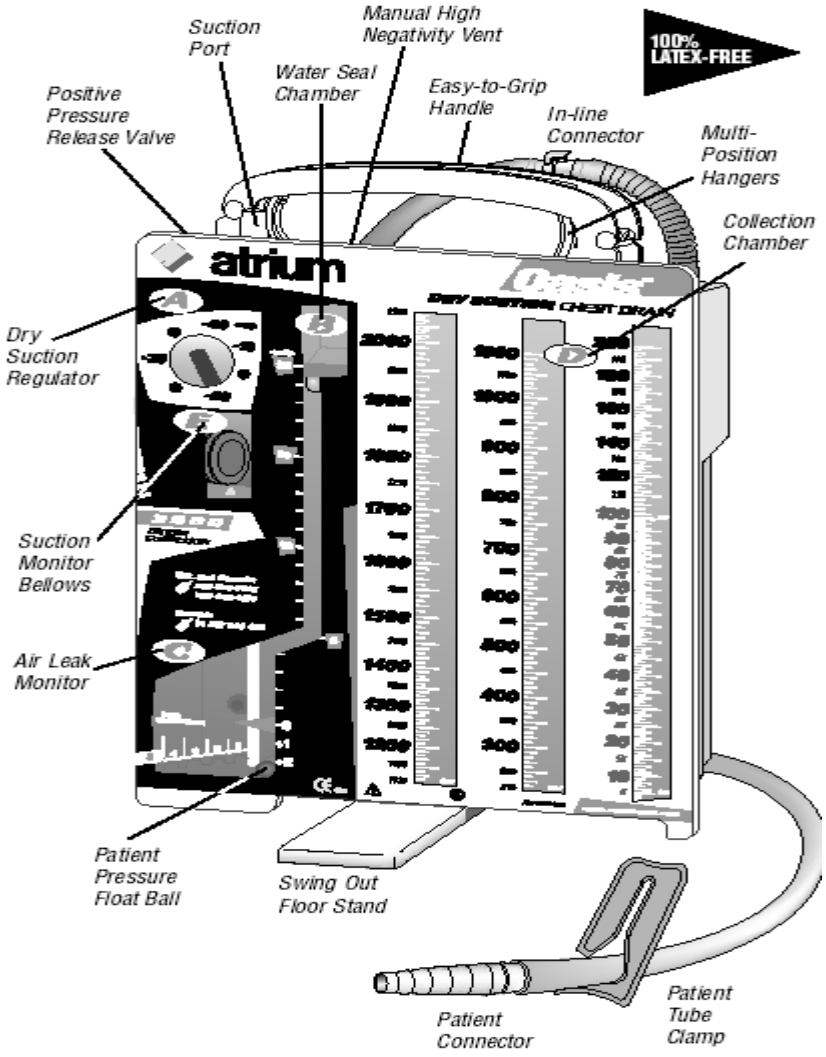
Source: Sugarbaker DJ, Bueno R, Krasna MJ, Mentzer SJ, Zellos L: *Adult Chest Surgery*: http://www.accesssurgery.com

Chest Tube contraindications and risks:

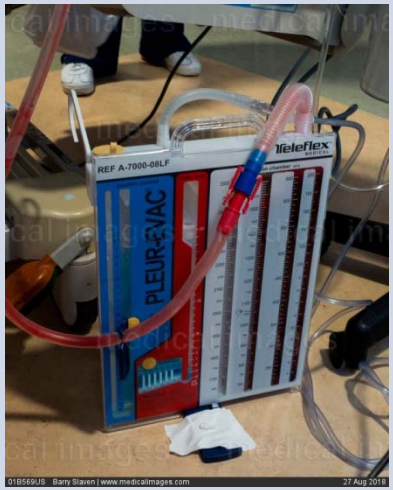
- There are **no definite contraindications** especially when a patient is experiencing respiratory distress.
- Risks may include:
  - Infection at the site of insertion
  - Bleeding at the site
  - Subcutaneous emphysema
  - Lung trauma and perforation of the diaphragm
  - Bronchopleural fistula
  - And most commonly, malposition of the chest tube

What is a chest drainage Unit?

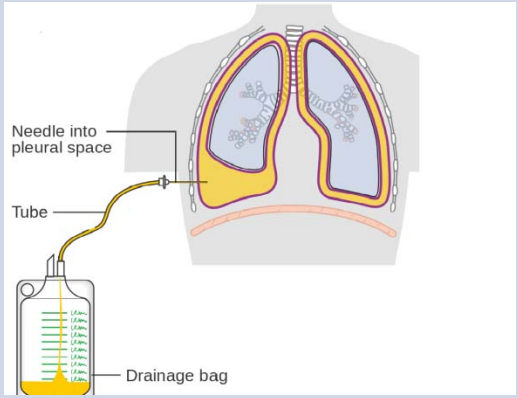
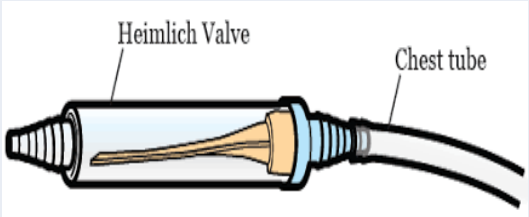
- Most commonly used chest drainage units use the **water-seal principle**. (e.g. Pleur-evac)
  - Continuous wall suction unit
  - Water-sealed unit ("no wall suction")
- This system:
  - collects drainage
  - creates a water seal
  - controls suction
  - allows air and fluid to escape from the pleural cavity but doesn't allow air to re-enter to restore negative pressure.



Types of chest Drainage Units (CDU):

Type	Description	Indications for use
Standard CDU 	▪ Drainage of pleural cavity for air or any type of fluid with or without the use of suction ▪ Up to 2,000mL capacity ▪ Replaced when full	▪ Following surgery that impacts on the continuity of the thoracic cavity (eg, thoracic, cardiac, esophageal surgery) ▪ Pneumothorax ▪ Hemothorax ▪ Pleural effusion ▪ Pleurodesis
Smaller portable CDU 	▪ Drainage without use of suction ▪ Dry seal system that prevents air leaks ▪ No lung reexpansion occurs ▪ 500mL max drainage ▪ Emptied when used in home	▪ For ambulatory patients ▪ Home care ▪ Chronic conditions

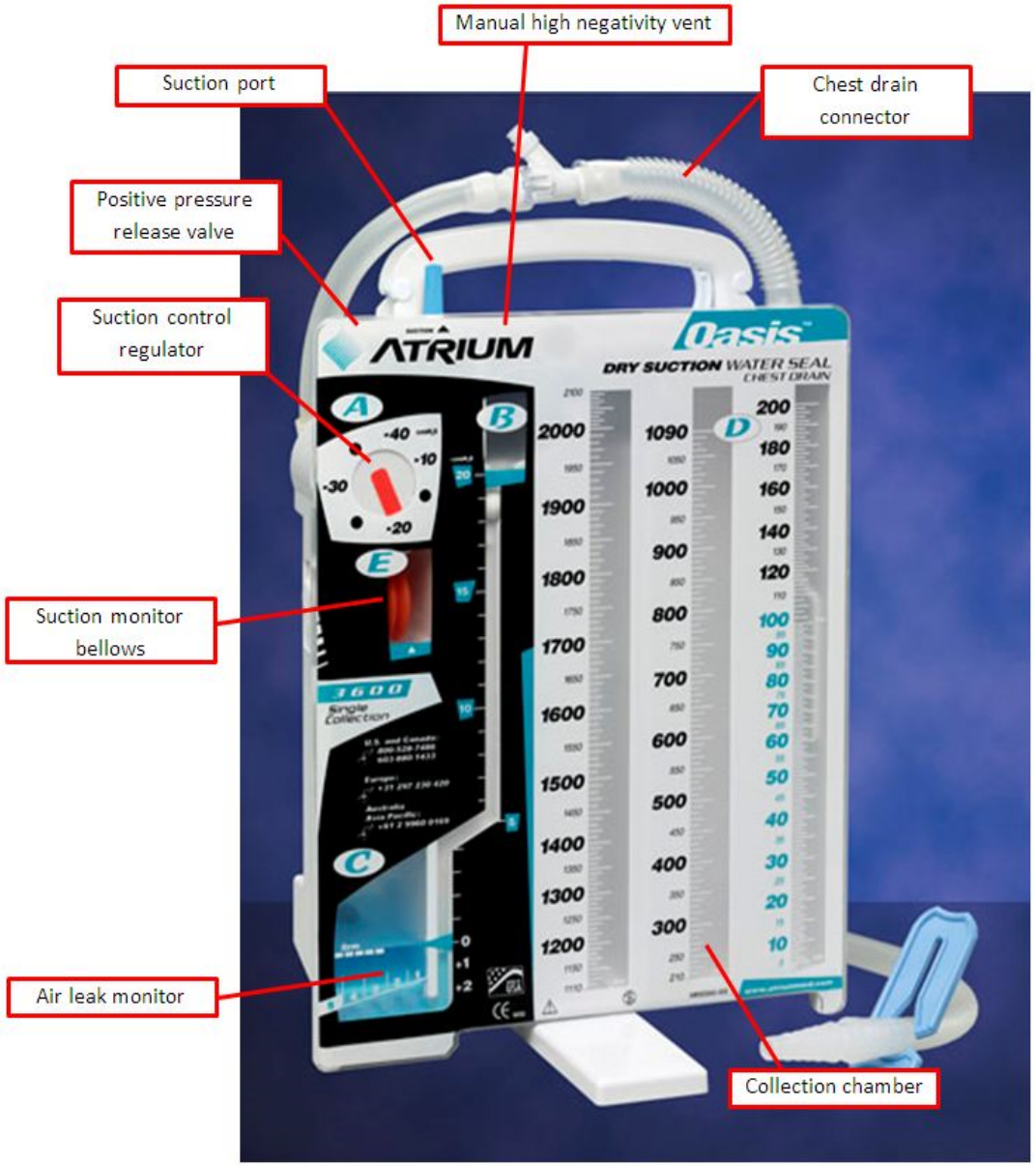
Types of chest Drainage Units (CDU):

Indwelling pleural catheter 	▪ Small-size chest tube or pigtail catheter (smaller than standard 14Fr) ▪ Can be irrigated if occluded by health care provider ▪ Less traumatic	▪ Pneumothorax ▪ Chronic drainage of fluid ▪ Not for trauma or blood ▪ Can be used for pleurodesis
Heimlich valve 	▪ One-way “flutter valve” ▪ Removes air as patient exhales ▪ Valve opens when pleural space pressure > than atmospheric pressure & closes when the reverse occurs	▪ Evacuates air from the pleural space ▪ Used for emergency transport, homecare, and long-term care units. 

WHAT IS THE CHEST DRAINAGE UNIT (CONT'D):

- The water seal drainage system is a single unit with three chambers.
  - **1st chamber**: "collection chamber"; receives fluid and air from the chest cavity through the collecting tube attached to the chest tube.
  - **2nd chamber**: "water-seal chamber"; with 2cm of water acting as a one-way valve, allowing drainage out but preventing backflow.
  - **3rd chamber**: "controlled suction";
    - Type 1-Continuous wall suction unit
    - Type 2-Water-seal unit ("no wall suction")

Type of Chest Drainage unit used in GMHA:



Continuous Wall Suction Unit

VS

Water-Seal Unit (no wall suction)

2 COMMON TYPES OF ORDERS FOR THE CHEST DRAINAGE UNIT USED IN GMH:

- **Continuous Wall Suction Unit**
  - connected to a wall suction source
  - uses a **suction monitor bellow** that balances wall suction.
    - a restrictive device or regulator is used to dial the desired negative pressure
  - No bubbling
  - No water evacuation

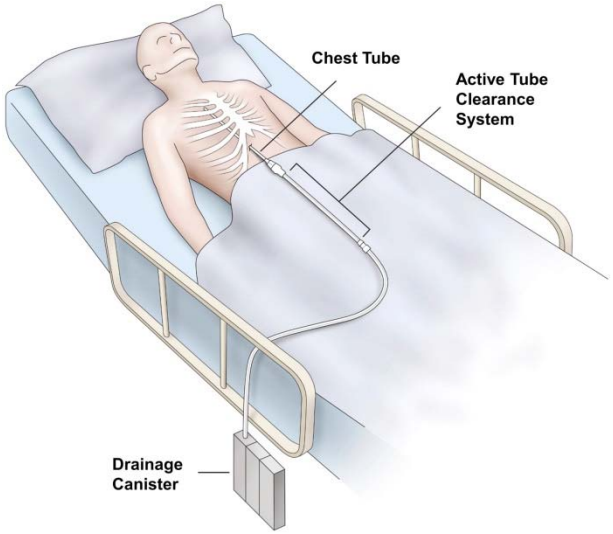
- **Water-Seal Unit ("no wall suction")**
  - regulated by height of water in the suction control chamber when connected to the wall suction.
    - 8-15cm for neonates
    - 20cm for all others in the chamber
  - You should **hear and see bubbling** while it's working.
  - Water can evaporate over time.
  - drains by gravity

Nursing Roles and Responsibilities:

How to manage a patient with a chest drainage unit

First: CHECK the patient !!!

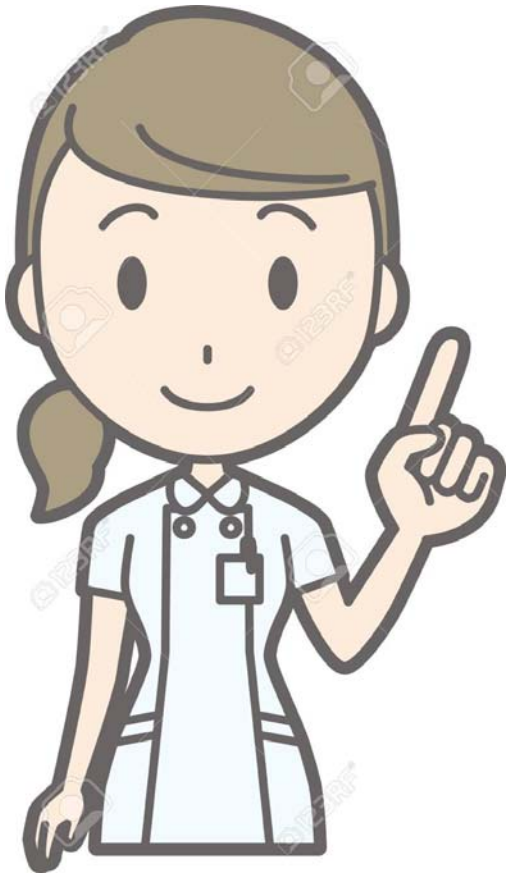
1. INITIAL ASSESSMENT:
   - Asses patient's clinical status and vital signs.
   - Encourage the patient to report breathing difficulty immediately.
2. Check the rate and the quality of the patient's respirations
   - <u>Auscultate breath sounds EVERY shift.</u>
   - Diminished or absent breathe sounds may indicate that the lung has not yet re-expanded.
   - Observe and report immediately signs of rapid, shallow breathing, cyanosis, pressure in the chest, subcutaneous emphysema or symptoms of hemorrhage.



Second: CHECK the Drainage Unit!!!

3. Do an initial assessment of the drainage unit.

- Check the **suction control dial** to ensure that it is in the correct setting. If the suction is ordered, check to see if the orange float appears in the suction indicator window.
- Make sure that the drainage unit is **balanced and stabilized** around the patient.



CHECK the connections !!!

4. Check the tube **connections periodically**. Make sure all tube connections are sealed air tight and secured.

   - Tape, if necessary. The tube should be **as straight as possible** and coiled below level of chest without dependent loops.
   - Make sure the tubing does not loop or interfere with the movement of the patient.
   - Do not let the patient lie on collecting/tubing drainage.
   - Milking and stripping of chest tubes to maintain patency is NOT recommended. (This may cause increase in intrapleural pressures and damage the pleural tissue.)
   - If it is necessary to help the drainage move through the tubing, apply a gentle squeeze-and-release motion to small segments of the chest tube between your fingers.

CHECK for fluctuations !!!

5. In a **continuous wall suction**, the unit is connected to a suction source and gentle bubbling will be heard.

6. <u>Check for fluctuation in the water-seal chamber as the patient breathes.</u>
   - Normal fluctuations of 5-10cm reflect pressure changes in the pleural space during respiration. To check for fluctuation when a suction system is being used, momentarily disconnect the suction system so that air vent is opened, and observe for fluctuation.

CHECK for fluctuations !!!

7. Fluctuations of fluid in the chamber will stop when:
   - The lung has re-expanded
   - The tubing is obstructed by blood clots or fibrin.
   - A dependent loop develops.

CHECK for bubbling !!!

8. Check for intermittent bubbling in the water-seal chamber. This occurs normally when the system is removing air from the pleural cavity. If bubbling isn't readily apparent during quiet breathing, have the patient take a deep breath or cough. Absence of bubbling indicates that the pleural space has sealed.

CHECK for bubbling !!!

9. If excessive bubbling is present in the water-seal chamber, especially if suction is being used, rule out a leak in the drainage system.

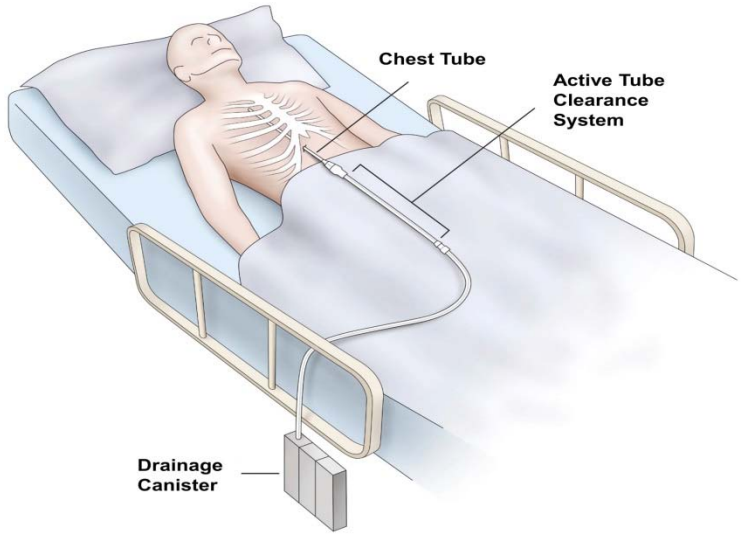
- Try to located the leak by clamping the tube momentarily at various points along its length.
- Begin clamping at the tube's proximal end, and work down toward the drainage system, paying special attention to the seal around the connections.
- If a connection is loose, push it back together and tape it securely. The bubbling will stop when a clamp is placed between the air leak and the water seal.
- If you clamp along the tube's entire length and the bubbling doesn't stop, the drainage unit may be cracked and needs replacement.

CHECK the drainage !!!

10. NOTE: Character, consistency, and amount of drainage. Mark the **date and time** of the original fluid level, then every shift on the CDU.
    - **Don't forget to chart on nurse's notes and I/O flowsheet every shift.**
11. If the drainage collection chamber fills, replace it. To do this, clamp the tube close to the insertion site, exchange the system, remove the clamps and re-tape the connection.
    - **NEVER leave a chest tube clamped for more than a minute.**
    - **DO NOT clamp chest tubes of neonates who are on positive pressure ventilation.**

CHECK range of motion !!!

12. Put the arm and shoulder of the affected side through ROM exercises several times daily. Some pain medication may be necessary.
    - Encourage the patient to assume a position of comfort. Encourage good body alignment. When the patient is in a lateral position, place a rolled towel under the tubing to protect it from the weight of the patient's body. Encourage the patient to change position frequently.



CHECK positioning & transport !!!

13. Encourage the patient to breathe deeply and cough at frequent intervals to help drain the pleural space and expand the lungs. Also tell him to sit upright for optimal lung expansion. If there are signs of incisional pain, adequate pain medication is indicated.
14. If the patient has to be transported to another area, place the drainage system **below the chest level** (as close to the floor as possible).
15. If the tube becomes disconnected, cut off the contaminated tips of the chest tube and tubing, insert a sterile connector in the chest tube and tubing, and reattach to the drainage system. Otherwise, DO NOT clamp the chest tube for more than one minute during transport.

CHECK the dressing !!!

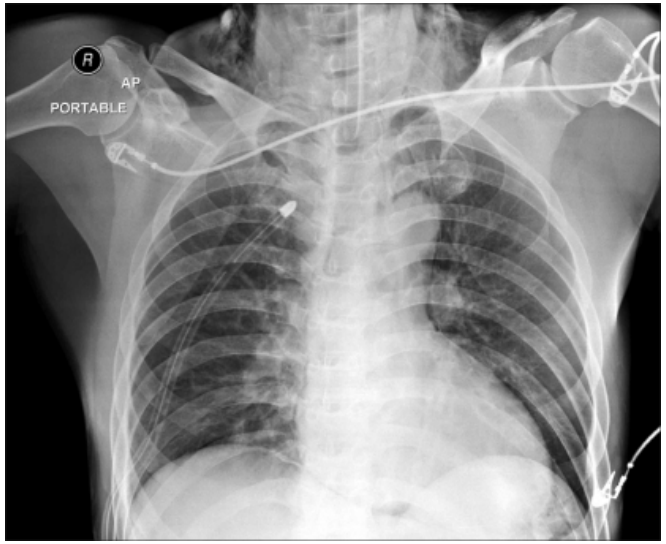
16. Check the chest tube dressing at least **every 8 hours**. Palpate the area surrounding the dressing for crepitus or subcutaneous emphysema, which indicates that air is leaking into the subcutaneous tissue surrounding the insertion site. **Change the chest tube dressing as ordered or when necessary**.
    - Apply a sterile 4x4 occlusive dressing with Vaseline gauze around the chest tube insertion site.
    - For Neonates: dressing needs not be changed unless wet, dirty, or loose. Place a slit 2x2 gauze under that tube and on top of the tube.
    - Tape securely in place.

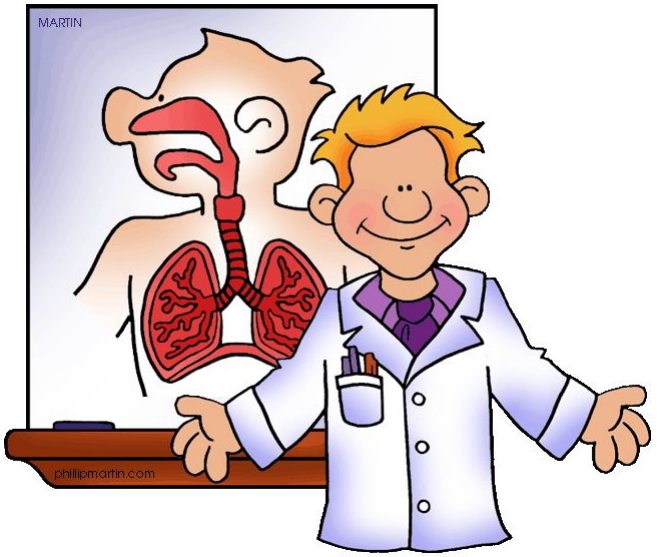
CHECK the Chest tube !!!

17. If the chest tube gets dislodged, do not push tubes back into the patient.
    - To prevent air from being sucked into pleural cavity, apply a sterile pressure dressing and notify MD immediately.
    - If not completely dislodged, but slips out slightly to expose an air hold in the tube:
        - apply petroleum jelly gauze over the hole
        - For Neonates: apply 2x2 with polysporine ointment
        - THEN CALL MD.

CHECK the order !!!

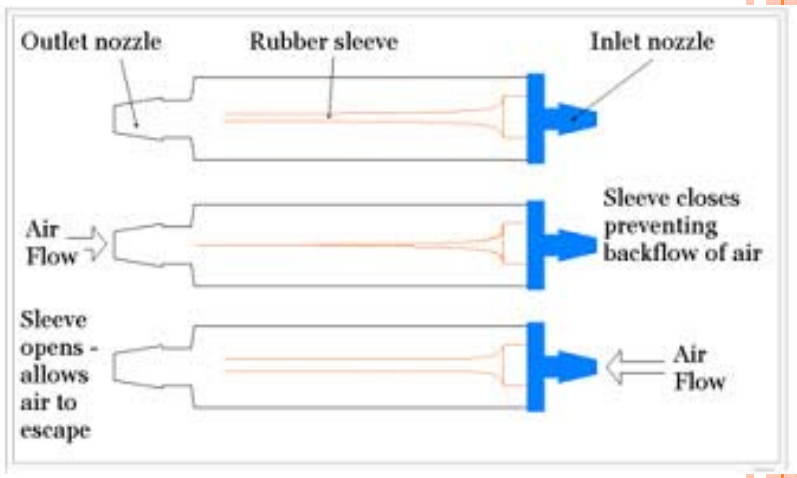
18. DAILY chest X-Rays must be ordered by the physician.





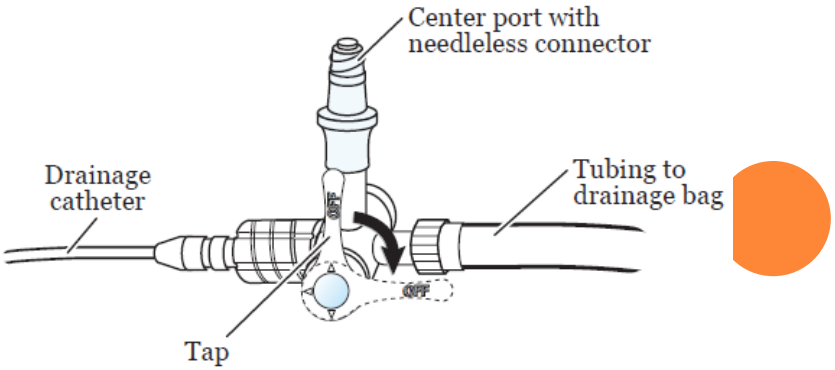
Alternative to CDUs: Heimlich chest drainage valve

- Also known as the "**flutter valve**," drains the chest cavity without using a CDU.
- Connects to chest tubing and allows fluid and air to pass in only one direction.
- Should NEVER BE CLAMPED.
- Regulated suction can be attached to it if necessary.
- Valve **drains into a plastic bag** that can be held at any level, allowing the patient undergoing chest drainage to be ambulatory simply by carrying the bag.



SPECIAL CONSIDERATIONS: STOP COCKS USED FOR CHEST TUBE DRAINAGE

- A suction control stopcock conveniently regulates vacuum to the chest drain.
- It provides control of suction bubbling and allows efficient use with any unregulated suction source.
- The stopcock must be on for initial system set up and **SHOULD NOT** be turned off during patient use.



KEY POINTS TO REMEMBER!!!

- CHECK the water level in the water-seal chamber every 8 hours.
- DOUBLE CHECK on initial assessments and before leaving your patient: ALL tubes are connected and that **drainage unit is balanced and stabilized.**
- AVOID lifting the drainage system above the patient's chest.
- Milking and stripping of chest tubes to maintain patency is NOT recommended.
- NEVER leave a chest tube clamped for more than a minute.
- WATCH for leaks of air in the drainage system as indicated by **constant bubbling** in the water-seal chamber.
- A stop cock SHOULD NOT be turned off during patient use.
- Tell the patient to report breathing difficulty IMMEDIATELY.
- **DOCUMENT**: nurse's notes & I/O every 8 hours.
- Follow up if there is a **DAILY CHEST X-RAY** ordered by the physician.

GMHA Policy: Care of the Patient With A Thoracic Drainage System

GUAM MEMORIAL HOSPITAL AUTHORITY
SURGICAL WARD
POLICY AND PROCEDURE MANUAL

APPROVED BY:	RESPONSIBILITY:	EFFECTIVE DATE:	POLICY NO.:	PAGE:
Zennia Pecina, RN, MSN Associate Administrator of Nursing Services	Nursing Services	4/11/2007	6353-ll-H-14	1 of 2
TITLE: CARE OF THE PATIENT WITH A THORACIC DRAINAGE SYSTEM				
LAST REVIEWED/REVISED: 1/2016				
ENDORSED: NM 7/2015; MEDICINE 8/2015; Surgery1/2016				

PURPOSE:

The thoracic drainage system uses both gravity and suction to restore negative pressure, remove material that collects in the pleural cavity, or to re-expand a partially or totally collapsed lungs. An underwater seal in the drainage system allows air and fluid to escape from the pleural cavity but doesn't allow air to reenter. It is a self-contained, disposable system that collects drainage, creates a water seal, and controls suction.

POLICY:

A registered nurse or licensed practical nurse is responsible for monitoring, measuring, and recording the drainage from a chest tube via a thoracic drainage system.

Nursing Considerations:

1. Avoid lifting the drainage system above the patient's chest because fluid may flow back into the pleural space.
2. Tension pneumothorax may result from excessive accumulation of air, drainage, or both and eventually may exert pressure on the heart and aorta, causing a fall in cardiac output.
3. Tell the patient to report breathing difficulty immediately. Notify the doctor immediately if the patient develops cyanosis, rapid or shallow breathing, subcutaneous emphysema, chest pain, or excessive bleeding.
4. Have two rubber-tipped clamps readily available to clamp the chest tube if the system cracks or to locate an air leak in the system.
5. Never leave a chest tube clamped for more than one minute. Keeping it clamped too long can cause a tension pneumothorax, which may occur when clamping stops air and fluid from escaping.

PROCEDURE:

1. Note the character, consistency, and amount of drainage in the drainage collection chamber.

GMHA Policy:
Care of the patient with chest tubes

GUAM MEMORIAL HOSPITAL AUTHORITY
MEDICAL SURGICAL WARD
POLICY AND PROCEDURE MANUAL

APPROVED BY:	RESPONSIBILITY:	EFFECTIVE DATE:	POLICY NO.:	PAGE:
Zennia Pecina, RN, MSN Associate Administrator of Nursing Services	Nursing Services	08/2015	6173-21A	1 of 2
TITLE: ASSISTING WITH CHEST TUBE INSERTION				
LAST REVIEWED/REVISED: 08/15				
ENDORSED: NM 08/15; MEDICINE 08/15				

PURPOSE:

Chest tube insertion allows drainage of air or fluid from the pleural space. This procedure is performed by a doctor with the assistance of a nurse. After insertion, the chest tube is connected to a thoracic drainage system that removes air, fluid, or both from the pleural space and prevents backflow into that space, thus promoting lung re-expansion.

POLICY:

The registered nurse or licensed practical nurse is responsible for assisting the doctor with the insertion of a chest tube.

Nursing Considerations:

1. Have rubber-tipped clamps readily available. If a drainage system cracks or if a tube disconnects, clamp the chest tube momentarily as close to the insertion site as possible. Since no air or liquid can escape from the pleural space while the tube is clamped, observe the patient closely for signs of tension pneumothorax while the clamp is in place.

2. In your notes, document date and time of chest tube insertion, insertion site, drainage system used, presence of drainage, patient's vital signs and auscultation findings, complications and nursing actions taken.

PROCEDURE:

1. After the doctor has explained the procedure to the patient, ensure that the patient signs the appropriate consent form.

2. Gather all necessary equipment and supplies: sterile gloves, linen saver pad, vial of 1% lidocaine, betadine solution, 3cc syringe, alcohol pad, 22G 1" needle, 25G 3/8" needle, sterile scalpel, #15 blade, sterile forceps, rubber-tipped clamp, sterile 4x4 gauze dressings, 4" elastic tape (Elastoplast), 1" adhesive tape for connections, appropriate chest tube size (doctor will specify size), suture material (doctor will specify), thoracic drainage system (Pleur-evac), 1 liter of sterile water for thoracic drainage system, drainage tubing and connector, Y connector (for two chest tubes on the same side), petroleum gauze (optional).

REFERENCES:

- Nettina, S. (Ed.) (2010). The Lippincott Manual of Nursing Practice (9th ed.). Philadelphia, PA: Lippincott-Raven Publishes
- GMHA Policy: Care of the Patient With A Thoracic Drainage System and Care of the Patient With A Chest Tube
- GMHA Policy: Assisting With Chest Tube Removal
- Rn.com: AMN Healthcare Education Services (2013). Chest Tube Management. Retrieved September 4, 2018 from https://lms.rn.com/getpdf.php/1933.pdf.

THANK YOU!

- To ensure comprehension of this online course please complete the online examination on our GMHA Portal:
  - Employee Portal
  - GMHA Management of Patients with a Chest Drainage Unit
- Your quiz is available at: testmoz.com/1859504.
- **Please follow instructions on the next page in order to login**
- A score of 80% or greater is necessary to pass the exam. If you do not pass the exam, please re-take the exam until a passing score is achieved. Exams are timed and any questionable submissions will be reported to your Supervisors.

User Name & Password:

- In ALL CAPS, Please Indicate your **Unit** as one of the following:
- ADMN, ADMNNL (for non-licensed), SSD, RAD, ER, ICU, HEMO, LR, MSW, NICU, OBW, OR, PEDS, SNU, SW, TELE
- followed by your **first initial**, **full last name** and **employee ID number** (found on your ID badge) with NO SPACES in between.

For Example:

- LDLKIM123456
- ADMRAPURON56789

- Student Quiz Passcode: **GMHA**