

PROTOCOL

TITLE: CHEST TUBE DRAINAGE SYSTEM

PURPOSE: To outline the nursing management of a patient with pleural chest tubes and disposable closed drainage device.

LEVEL: ___ Dependent ___ Independent x Interdependent

SUPPORTIVE DATA:

1. Chest tubes are inserted to evacuate air/and or fluid from the pleural space, to re-establish and maintain normal intrathoracic pressures, and to facilitate lung re-expansion.
2. The following are indications for chest tube insertion:
 - a. Blood collects in pleural cavity (hemothorax)
 - b. Air collects in the pleural cavity (pneumothorax)
 - c. Pus collects in pleural cavity (pyothorax)
 - d. Lymph collects in pleural cavity (chylothorax)
3. Invasive procedure consent form and time out form are required.
4. Procedure for assisting with insertion and removal can be found in Perry and Potter Reference, chapter 25.

CONTENT: A) Assessment B) Monitoring and Nursing Care C) Reportable Conditions D) Patient Education
E) Emergency Measures and F) Documentation

A. Assessment

Assess the following parameters on initial insertion, at the beginning of each shift and according to patient acuity and unit specific assessment requirements.

1. Assess respiratory rate, effort, chest symmetry, breath sounds and oxygen saturation.
2. Assess the amount and type of drainage.
3. Outline any drainage on chest dressing, include time and date.
4. Assess any bubbling in water seal chamber. Bubbling indicates the presence of an air leak. If bubbling is intermittent, it's from the pleural space. Constant or excessive bubbling usually indicates a loose connection or leak in the drainage system itself. Bubbling normally decreases over time as the pleural air leak resolves. A sudden start or cessation of bubbling warrants immediate attention.
5. Assess for tidaling/fluctuation. Tidaling is the movement of fluid in the water seal chamber tube and the chest tube itself. Tidaling indicates the chest tube is functioning properly as fluctuations indicate the changes in intrathoracic pressures. The absence of tidaling may indicate the chest drainage system is blocked or the lung has fully expanded.
6. Assess for presence of subcutaneous emphysema and its location. Mark borders of subcutaneous emphysema with a skin marker to track its spread or resolution.
7. Assess pain and implement appropriate interventions while the chest tube is present.

B. Monitoring and Care/Maintenance

- a. Check to make sure connections are secured and taped.
- b. Check to see suction bellow is inflated and dry suction is pointing towards appropriate suction amount.

- c. If suction is ordered and the suction bellow is not seen, adjust continuous wall suction to maintain visibility of orange bellows.
- d. Never routinely clamp tubes.
- e. Prevent dependent loops by coiling excess tubing next to patient in bed.
- f. Change drainage collection chamber when it reaches capacity. Change according to manufacturer's instructions.
- g. Check the chest tube dressing every shift and PRN. Change the dressing PRN according to physician preference. If no preference indicated, apply an occlusive dressing of petrolatum gauze (i.e. Vaseline® gauze) around chest tube where it enters skin. Next apply two or more drainage sponges (split sponges) oriented at 90 degrees to each other. Tape dressing with adhesive tape, date, time and initial dressing
- h. After initial insertion, assure chest xray confirms appropriate placement.
- i. Transporting the patient should be done without clamping the tube and should ensure that the container remains upright. The water seal should remain below the chest tube insertion site.
- j. Place patient in the semi fowler's position at 30 to 45 degrees unless contraindicated. Patient is to be propped and fully supported in positions that promote optimum comfort, breathing and pulmonary drainage.
- k. Ambulate patient and/or out of bed to chair as ordered
- l. Turn and reposition patient side to side every two hours as tolerated.

C. Reportable Conditions

1. The following conditions are to be reported to the physician:
 - a. New or extending subcutaneous emphysema.
 - b. Any deterioration in vital signs, respiratory distress, clogged tubes, hypovolemic shock or excessive water seal leak (i.e. continuous leak not attributable to the system).
 - c. Bleeding in excess of 250ml/hr in an hour or more than 500mL is drained in a shift.
 - d. Any irregularity in function of drainage system.

D. Patient Education

1. Instruct patient to cough and deep breathe every two hours.
2. Instruct patient on how to splint wound with pillow.
3. Instruct the patient that the drainage system is to be kept below the patient at all times.

E. Emergency Measures

1. Disconnection. If the chest tube becomes disconnected:
 - a. **Immediately** re-connect to the drainage system or submerge the chest tube in a bottle of sterile saline or water to 2-4cm below the water surface. If possible, quickly clean the exposed chest tube with an alcohol swab prior to reconnection to the drainage system.
 - b. Re-secure connection with adhesive tape using a spiral application technique.
 - c. Once suction/water seal is re-established, assess the patient's respiratory status including bilateral breath sounds and notify physician.

2. Dislodgement: If the chest tube is accidentally pulled out:
 - a. Promptly apply Vaseline gauze and several 4 X 4s; tape on three sides only (allows air to escape but not be drawn in).
 - b. Notify hospitalist/primary physician immediately and prepare for new tube insertion.
 - c. Remain with the patient and monitor vital signs and oxygen saturation; observe for decreased BP, increased HR, increased RR, tracheal shift.
3. Tension Pneumothorax:
 - a. Observe for acute respiratory distress characterized by increased respiratory rate, shallow respirations, decreased breath sounds, asymmetrical breathing, increased heart rate, decreased blood pressure, cyanosis, tracheal shifting, failure of chest tube and/or water seal chamber to fluctuate.
 - b. Notify physician STAT and prepare for new tube insertion, STAT chest x-ray as ordered.
 - c. Remain with patient; place in high fowlers position; monitor vital signs every 5 minutes; check for chest tube occlusion, i.e. kinked, clamped or clots in tube – if possible relieve obstruction immediately.
4. Excessive Air Leak: If water seal chamber bubbling is continuous and excessive, check patient and system for air leak.
 - a. Clamp chest tube briefly close to chest wall; if bubbling stops, then air leak is inside patient; **unclamp tube (to prevent possible tension pneumothorax) and notify physician STAT**
 - b. If bubbling continues, clamp tubing briefly moving downward until source is found. Once clamp is below leak, bubbling will stop. Secure all connections and retape. Notify physician if bubbling continues.
 - c. Check insertion site for source of air leak by applying gentle pressure around site with hands. If bubbling stops, change dressing by applying new Vaseline gauze and occlusive dressing; notify physician if dressing change unsuccessful in stopping air leak.

F. Documentation

1. Date and time of insertion procedure, including physician who performed the procedure
2. The following is documented with insertion and each ongoing assessment:
 - a. Chest tube size and location on insertion and with each assessment
 - b. Suction level
 - c. Drainage color, type and amount of initially obtained
 - d. Presence/absence of bubbling in air leak chamber
 - e. Presence/absence of tidaling (fluctuation of drainage)
 - f. Presence/absence of subcutaneous emphysema, location and size of area. Mark borders of subcutaneous emphysema with skin marker for further assessment
 - g. Patient's respiratory status/assessment following procedure (i.e. respiratory rate, depth, effort, chest expansion symmetry, oxygen saturation)
 - h. All pain assessments with follow up interventions if applicable.

References:

1. Lynn-McHale Wiegand D. AACN Procedure Manual for Critical Care. 6thth Edition. 2011. WB Saunders . Procedure 21,23 and 24.
2. Perry A. and Potter P. Clinical Nursing Skills and Techniques. 7th Edition. 2010, Elsevier Mosby Chapter 26.
3. <http://www.atriummed.com/PDF/GreenHandbook.pdf>, March 2011
4. Durai, R. and Happy, H. "Managing a chest tube and Drainage System". AORN Journal Vol 91 No2, February 2010 pages 275-280.