Chest Tubes: Removal Post Cardiac Surgery (CSICU)

Site Applicability

SPH CSICU

Practice Level

Limited to nurses in the CSICU who have received education and supervised practice. This action is within the RN scope of practice with a physician's order.
This applies to **Blake, Thal and Argyle tubes only. Pigtail tubes must be removed by physician**

Policy Statements

1. Physicians are responsible for
    a. assessing chest X-ray prior to removal of chest tubes
    b. ordering chest tube removal
    c. identifying chest tubes as pleural or mediastinal
    d. removing pigtail chest tubes

Need to Know

1. The following criteria should be used to determine if it is appropriate for a Registered Nurse to remove chest tubes:
    - Drainage less than 100 mL in the past 4 hours
    - Chest tubes have been in situ for 6 to 8 hours.
    - No evidence of air leak
    - Patient's respiratory and hemodynamic status is stable
    - Patient weaned from mechanical ventilation (physician to assess if chest tubes may be removed while still ventilated)
    - MD to verify that CXR shows lungs are expanded with no evidence of atelectasis, pleural effusion, pneumothorax or mediastinal widening
    - Results of coagulation studies are within normal limits (INR: less than 1.3, PTT less than 40, platelets more than 50,000)
    - Physician has ordered "chest tube removal as per protocol"
2. For safety reasons chest tube removal is a 2-person procedure. One nurse is responsible for pulling the chest tubes and the other provides pressure to the chest tube site during and after chest tube removal and suture tying.
3. Suction should **remain on** throughout the chest tube removal

** **If 2 chest tubes are bridged (Y'd)** then one of the chest tubes should be clamped just prior to removal

4. All chest tubes are to be removed at the same time if removal criteria met (unless specific Physician order written to the contrary)
5. Chest tubes should be removed **rapidly** at the end of maximal inspiration while the patient is holding his/her breath. This maximizes intrapleural pressure and reduces the incidence of pneumothorax.
6. Petroleum jelly gauze is to be placed on **all** chest tube sites post removal.
7. Some resistance can be expected. *If strong resistance is encountered and rapid removal of the tube is not possible, discontinue the procedure and inform the physician immediately.*

Equipment and Supplies

1. Dressing tray
2. Chlorhexidine swabs
3. Non sterile gloves
4. Goggles
5. Sterile stitch cutter
6. Sterile 4 x 4 gauze
7. Absorbent pads
8. Dressing tray
9. Sterile petroleum jelly impregnated gauze

Procedure

Steps (Procedures)

PROCEDURE	RATIONALE
1. Verify physician's order for chest tube removal. Verify correct patient using two approved identifiers	
2. Prepare patient by explaining procedure and positioning in a supine or semi- fowlers' position.	
3. Ensure patient has been pre-medicated with anxiolytic/analgesic at least 20 minutes prior to chest tube removal	To promote patient comfort and increase the tolerance of procedure.
4. Wash hands with soap and water or with alcohol rub	
5. Don non sterile gloves and disposable goggles (PPE)	
6. Remove chest tube dressings.	

7. Place absorbent pads under chest tube insertion site.	
8. Cleanse insertion site with Chlorhexidine swab	To decrease chance of infection
9. Cut anchor stitches using sterile stitch cutter. Leave the long purse string suture ends intact and tie loosely at the free end.	Anchor stitches secure the chest tube to the skin. Tying the purse string loosely allows you to tighten it quickly once the chest tubes are removed.
10. Loosen tubes slightly by gently twisting them. Do not pull.	Provides quick check to ensure all anchor sutures are cut.
11. Have patient practice breathing technique	Helps to assess patient ability to take in deep enough breath and hold it.
12. Instruct patient to take a deep breath in and hold at maximum inspiration, (Valsalva manoeuver). With the wall suction on and using a constant motion, one nurse pulls all chest tubes simultaneously.	Pulling all tubes at once at end inspiration may decrease the incidence of pneumothorax. Examine each chest tube to verify that the entire tube has been removed
13. The 2nd nurse applies pressure on the chest-tube site using 4 x 4 gauze during chest tube withdrawal and tying of the purse string sutures.	Sterile petroleum jelly gauze should be applied to ALL tubes regardless if they are in the mediastinal or pleural position
14. Once the chest tubes are removed the ends of the purse string suture are pulled taut to allow approximation of the wound and the suture is tied three times in a knot	Avoid pulling the suture too tight to prevent tissue necrosis at the site and to facilitate easier removal later If no purse string was used, the site may be closed with adhesive skin closure sutures
15. Cover chest tube sites with a petroleum jelly gauze and sterile dressing	Petroleum jelly gauze applied to decrease likelihood of air being entrained and causing pneumothorax
16. Assess patient post chest tube removal for signs of respiratory distress, subcutaneous emphysema, tachypnea, and hemodynamic compromise. Notify physician immediately if any change in status (see Appendix A)	Assessment should include vital signs and a respiratory assessment including chest auscultation and palpation.
17. Obtain a chest X-ray post chest tube removal	Physician is responsible for reading and documenting on CXR.
18. Monitor site for signs of bleeding	

Documentation

Document the following in the Nurses Notes:

1. Patient preparation for removal of chest tubes

2. Document chest tube removed intact, if purse string sutures in situ & patient response to chest tube removal (vital signs, lung sounds, +/- subcutaneous emphysema).

Patient and Family Education

Patient should have removal procedure explained prior to removal and prior to administration of anxiolytic and/or analgesic medication. Information to be included in patient education:

- Chest tube removal may result in transient discomfort
- Medication will be administered at least 20 minutes prior to removal to increase comfort of the procedure
- Instruction regarding proper breathing techniques. Chest tubes should be removed at end of maximal inspiration with the patient holding his breath
- Semi-fowlers position will be used during removal of chest tubes
- Patients should be instructed to report signs and symptoms of respiratory distress (such as tachypnea, SOB, frequent cough, air hunger) or infection (such as pain, tenderness, redness or warmth at insertion site) immediately
- Patient should be encouraged to perform deep breathing and coughing exercises post chest tube removal to prevent complication caused by immobility

Related Documents

1. B-00-13-10025 - Cardiac Surgery, Postoperative Care
2. BD-00-07-40011 – Chest Tubes and Chest Drainage Systems: Patient Assessment and Interventions
3. BD-00-07-40010- Chest Tubes and Chest Drainage Systems: Maintenance of the Pleur-Evac Sahara

References

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2. Weigand,D.L.(Ed.).(2017. AACN procedure manual for high acuity, progressive, and critical care (7th ed.). St. Louis: Elsevier
3. Kane, C et al. Chest Tubes in the Critically Ill Patient, Dimensions of Critical Care Nursing 2013;32(3):111-117
4. Durai, R, Hoque, H, Davies,T. Managing a chest tube and drainage system. AORN Journal. 2010; 91(2); 275-283.

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Persons/Groups Consulted:

Cardiovascular Surgery Group

CSICU Staff Nurses

CSICU CNLs

Effective Date:	15-FEB-2005
Posted Date:	15-FEB-2005
Last Revised:	27-MAY-2019
Last Reviewed:	
Approved By:	PHC
	Professional Practice Standards Committee
Owners:	PHC
	Cardiac Surgery

Appendix A Possible Complications after Chest Tube Removal

Complications	Signs and Symptoms	Prevention	Treatment or Intervention
Pneumothorax	Decreased oxygen saturation as shown by pulse oximetry. Increased work of breathing. Diminished breath sounds on affected side Increased restlessness and complaints of chest discomfort.	Assess for air leakage in air leak meter before removal. Remove when patient in full inspiration. If there is no purse-string suture, seal the wound with an air occlusive dressing at the time of removal.	Notify physician. Obtain chest radiograph. Possibly, reinsert chest tube (by physician).
Bleeding (rare)	Persistent bleeding from the chest tube insertion site that repeatedly saturates an occlusive dressing.	May be unavoidable if chest tube was against vein or artery of chest wall before removal.	Apply pressure. Place tight occlusive dressing over site. Notify physician if bleeding persists.
Skin necrosis (purse-string suture)	Chest tube insertion site dark or inflamed, with necrotic areas visible.	Avoid pulling purse-string suture too tightly closed when chest tube is removed.	Notify physician. Remove purse-string sutures and cleanse wound.
Retained chest tube (rare)	Extreme resistance felt with chest tube removal. Chest tube obviously not intact after removal.	Stop removal efforts if extreme resistance is experienced with removal attempt. Inspect all removed tubes and tips for intactness.	Immediately notify physician. Consider possible re-sternotomy.
Infection of site	Inflammation, tenderness or purulent drainage at site. Increased body temperature.	Clean chest tube site with 0.05% Chlorhexidine solution or swab) after chest tube removal Apply sterile gauze dressing. If no purse-string sutures, apply sterile occlusive dressing.	Notify physician. Prepare for wound cultures.