Competency: The insertion and management of an intrapleural chest drain

Competency Statement: Registered practitioners will demonstrate proficiency in the set up and maintenance of chest tube drainage systems

Trainee name:

Trainee title:

Ward or department:

Method of assessment: Question and observation

Clinical assessor:

Name: Title:

The insertion and management of an intrapleural chest drain

Skill criteria		Knowledge criteria	
No errors observed	5	Evaluation: *articulates response, what, when how and why*	5
Occasional errors, corrected by trainee	4	Synthesis: articulates the *connections between the parts*	4
Frequent errors, corrected by trainee	3	Analysis: *able to examine how parts relate to the whole*	3
Frequent errors, not corrected by trainee	2	Application: *can relate facts to another situation*	2
Trainee unable to proceed without instruction/prompting	1	Knowledge and understanding: *provides examples and distinguishes differences between examples*	1

K= knowledge S= skill (minimum level 4)

Observable criteria	Tick level of achievement						Outcome		Assessors Signature and Date
	k / s	1	2	3	4	5	Pass X	Fail X	
1. Outline the anatomy and physiology of the lower respiratory tract	K 1								
2. Discuss the functions of the pleural membrane	K 1								
3. Explore the indications for the insertion of a thoracic drain	K 5								
4. Discuss two types of chest drainage systems used in the Trust	K 1								
5. Explore the complications associated with chest drain insertion	K 5								
6. Demonstrate the ability to set up a trolley for a chest drain insertion procedure	S 4								

Observable criteria	Tick level of achievement						Outcome		Assessors Signature and Date
	k / s	1	2	3	4	5	Pass X	Fail X	
7. Demonstrate the ability to prepare and connect an underwater seal drainage system	S 4								
8. Examine the reasons for changing a chest drain bottle	K 3								
9. Demonstrate the ability to change the bottle	S 4								
10. Examine the reasons for applying suction to a chest drain	K 3								
11. Demonstrate the ability to set up the chest drain on suction	S 4								
12. Demonstrates how to secure the underwater seal tubing and chest drain to patient to prevent dislodgement	S 4								
13. Distinguish the physiological processes behind a “swinging” and “bubbling” chest drain	K 3								
14. Explore actions to be taken by the registered nurse if chest drain is not swinging	K 5								
15. Explore actions to be taken by the registered nurse if chest drain there is excessive bubbling in the system	K 5								
16. Explore actions to be taken if the tubing becomes disconnected	K 5								
17. Explore actions to be taken if the chest drain falls out	K 5								
18. Explore actions to be taken if there is a sudden increase in drainage	K 5								

Observable criteria	Tick level of achievement						Outcome		Assessors Signature and Date
	k / s	1	2	3	4	5	Pass X	Fail X	
19. Explore actions to be taken if there is a sudden lack of drainage	K 5								
20. Explore actions to be taken if the eyelet holes of the chest drain are exposed	K 5								
21. Explore actions to be taken if the patient complains of pain	K 5								
22. Explore actions to be taken if the patients becomes breathlessness with a drop in O2 saturations (SpO2)	K 5								
23. Demonstrates the ability to remove a chest drain	S 4								

Learning log

Competency statement

I am competent in this procedure at this time and understand the standard statement, action and outcome. Having received appropriate training, I accept full responsibility for the maintenance my own competence and have discussed this role as part of my job description with the person to whom I am managerially accountable.

Practitioner's signature and date:

Signature: Date:

Printed name: Date:

I confirm that the above practitioner has achieved the required competency level

Assessed by:

Signature: Date:

Printed name: Date:

Job role:

Please place one copy in your professional portfolio and give a second copy to your line manager

Assessors Guidelines

Assessment Criteria	Minimum knowledge and/or skill
1. Outline the anatomy and physiology of the lower respiratory tract	The parts of the respiratory system are: • Upper respiratory tract: the nasal cavity, the mouth, larynx and pharynx • Lower respiratory tract: trachea, bronchial tubes, lungs, and diaphragm. • The respiratory system is responsible for the exchange of oxygen and carbon dioxide. It supplies oxygen to the blood and gets rid of carbon dioxide and other waste gases. It is also responsible for the production of sound. • The respiratory center is located in medulla oblongata (in the brain). Increases in CO2 and decrease in O2 in the blood will trigger respiratory center. Chemoreceptors in aorta and carotid arteries are also sensitive to the amount of blood oxygen. • To take a breath in, the external intercostal muscles contract, moving the ribcage up and out. The diaphragm moves down at the same time, creating negative pressure within the thorax. The lungs are held to the thoracic wall by the pleural membranes, and so expand outwards as well. This creates negative pressure within the lungs, and so air rushes in through the upper and lower airways. • Expiration is mainly due to the natural elasticity of the lungs, which tend to collapse if they are not held against the thoracic wall. This is the mechanism behind lung collapse if there is air in the pleural space (pneumothorax).
2. Discuss the functions of the pleural membrane	• The lungs are surrounded by two membranes called the pleurae • The outer pleura is attached to the chest wall and is known as the parietal pleura

Assessment Criteria	Minimum knowledge and/or skill
	• The inner one is attached to the lung and other visceral tissues and is known as the visceral pleura. • The space in between the two layers is called the pleural cavity or pleural space. This space is filled with a small amount of serous fluid. • The pleural fluid lubricates the pleural surfaces and allows the layers of pleura to slide against each other easily during respiration. • The pleural fluid also provides the surface tension that keeps the lung surface in contact with the chest wall. • Intrapleural pressure – negative pressure within the pleural cavity helps the lung to adhere to the chest wall. If one lung is punctured it will collapse due to the loss of negative pressure.
3. Explore the indications for the insertion of a thoracic drain	• Pneumothorax: Air in pleural space caused spontaneously or through trauma or iatrogenically through clinical procedures • Pleural effusion: Fluid in the pleural space. **Transudate effusions** are associated with problems outside of the lungs such as congestive cardiac failure, low proteins, nephrotic syndrome and cirrhosis. **Exudate effusions** occur because of an altered capillary permeability. Causes include bacterial or viral infection, inflammation, malignancy or drug induced nitrofurantoin, amiodarone, methotrexate or metronidazole • Haemothroax: Blood in the pleural space caused by chest injury such as fractured ribs • Empyema: Infected fluid (pus) in the pleural space caused by trauma, thoracic surgery, aspiration pneumonia or clinical procedures involving the pleura. • Chylothorax: Chyle (lymphatic fluid) in the pleural space. The cause is associated with a leak from the thoracic duct or one of the main lymphatic vessels. The most common clinical cause is lymphoma or trauma.

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4. Discuss two types of chest drainage systems used in the Trust	• Seldinger drains or pigtails – smaller chest drains inserted using a guide-wire technique (Seldinger technique). The drain can be connected to either an underwater seal bottle if placed for a pneumothorax or drainage bag if for pleural fluid. Small bore drains are recommended as they are more comfortable than larger bore tubes • Trocar/flexible drain – larger chest drains inserted using blunt dissection with forceps. The drain needs to be connected to an underwater seal bottle.The size of tube used is dependent on the reason for drainage. Large bore drains are recommended for drainage of acute haemothorax to monitor further blood loss.
5. Explore the complications associated with chest drain insertion	• **Tension pneumothorax** This complication can be life threatening and occurs when air enters the pleural cavity during inspiration but is unable to escape during expiration. To prevent this complication the tubing should be placed horizontally across the bed before dropping vertically into the chest drain bottle. This minimises the risk of lopping and kinking. • **Surgical emphysema** This occurs when air cannot escape down the tubing and enters the subcutaneous tissues. This can result in facial, neck, arm or chest swelling and can occur when the chest drain moves and the holes are situated outside of the pleural cavity or the chest drain becomes blocked or kinked. To prevent this complication the tubing should be placed horizontally across the bed before dropping vertically into the chest drain bottle. This minimises the risk of lopping and kinking. • **Infection** Localised infection around the chest drain site or empyema may occur as

Assessment Criteria	Minimum knowledge and/or skill
	a result of a chest drain. To prevent this complication an aseptic technique must be used for chest drain insertion and manipulation. • **Tube disconnection and pneumothorax** A secondary pneumothorax can occur if the system becomes disconnected. To prevent this occurring, the tubing must be secured effectively. • **Oedema** Re-expansion pulmonary oedema, if large amounts of fluid are drained from a pleural effusion over a short period of time (Laws et al. 2003). • **Incorrect placement** Extrapleural OR intrapulmonary OR subdiaphragmatic. • **Surgical emphysema** Associated with air in the tissues
6. Demonstrate the ability to set up a trolley for a chest drain insertion procedure	Cleans the trolley in line with Trust policy and collects the following equipment: • Sterile gown and gloves. • Antiseptic solution, sterile drapes • Gauze swabs and dressing • Sterile syringes and needles • Local anaesthetic lidocaine 1% or 2% • Scalpel • Sutures 1/0 or 2/0 silk • Instrument for blunt dissection • Chest tube (Seldinger type requires guidewire and dilators) • Connecting tube • Closed drainage (underwater seal with sterile water)

Assessment Criteria	Minimum knowledge and/or skill
7. Demonstrate the ability to prepare and connect an underwater seal drainage system	**Procedure:** • Performs hand hygiene • Collects and prepares the equipment • Explains the procedure to the patient ensuring privacy • Fills the chest drain bottle to underwater level with sterile water and then replaces the tubing • Ensures the tubing remains sterile throughout the procedure • Ensure chest drain is below patient's chest level • Hand the tubing to the medical practitioner to connect to the chest drain • Ensures that the connections are secured • Assesses patient • Dispose of equipment as per policy • Perform hand hygiene • Document procedure on the Trust's TPR and Chest Drain Observation Chart • Monitor effects and report any abnormal findings immediately
8. Examine the reasons for changing a chest drain bottle	The chest drain unit should be changed if: – There is damage to the bottle or tubing – When drainage level reaches 700mls. High fluid levels in the bottle increases resistance to further drainage and may impact on the patient's respiratory function, as greater effort is required by the patient to breathe against an increasing pressure. – At least every 48 hours, to minimise the risk of infection
9. Demonstrate the ability to change the bottle	Procedure: • Performs hand hygiene • Collects and prepares the equipment • Explains the procedure to the patient ensuring privacy

Assessment Criteria	Minimum knowledge and/or skill
	• Fills the chest drain bottle to underwater level with sterile water and then replaces the tubing • Observes patient throughout this activity • Clamps drain securely with the two sets of clamps above the join between the drain and the tubing • Performs hand hygiene and applies gloves • Unscrews tubing from the old bottle and insert rod into the new bottle • Maintains aseptic technique to avoid contamination • Ensure chest drain is below patient's chest level • Releases the two clamps and checks the action of the drain • checks patient • Disposes of equipment as per policy • Performs hand hygiene • Documents procedure, monitor effects and report any abnormal findings immediately.
10. Examine the reasons for applying suction to a chest drain	• The addition of suction increases the negative pressure and increases the likelihood of lung re-expansion. • It is most commonly used for persistent air leak or for patients with empyema
11. Demonstrate the ability to set up the chest drain on suction	**As per policy** **Key action:** Uses only use a high-volume, low pressure-suction unit **Rationale:** Prevents excessive negative pressure which may damage the lung **Key action:** Places a second suction bottle between the suction unit and the underwater seal bottle

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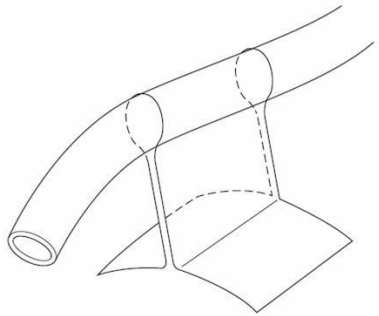
	Rationale: Prevents any overflow of secretions reaching the suction unit. If allowed: suction would fail, a closed system would ensue and tension pneumothorax may occur **Key action:** Ensures adequate analgesia prior to commencing/increasing suction via the chest drain **Rationale:** The addition of suction may be painful **Key action:** The amount of suction is prescribed by the medical practitioner and must be documented. Usually 10-20cmH_2O **Rationale:** High pressures can cause lung injury **Key action:** When discontinuing suction, immediately remove the suction tubing to the underwater seal **Rationale:** If tubing remains connected a closed system ensues which could result in tension pneumothorax
12. Demonstrates how to secure the underwater seal tubing and chest drain to patient to prevent dislodgement	 as per policy
13. Distinguish the physiological processes behind a "swinging" and "bubbling" chest drain	• In a pneumothorax, *bubbling* indicates that air is being removed from the pleural space and is visible in the water seal bottle. This usually occurs on expiration, or when the patient coughs. The

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	bubbling will eventually stop as the lung re-expands and the air leak resolves. Continuous bubbling however may indicate a severe or worsening air leak. No bubbling or swinging may indicate that the chest drain is blocked. • Changes in intrapleural pressure occur during inspiration and expiration and this can be seen in the chest drain bottle. During inspiration the water in the chest drain tube rises and then falls during expiration. This "*swing"* is useful in assessing tube patency and confirms the position of the tube in the pleural cavity.
14. Explore actions to be taken by the registered nurse if chest drain is not swinging	**Cause:** The absence of a swing may indicate that the tube is blocked **Complication:** If the drainage in the tube is impeded, there is potential risk for a tension pneumothorax or surgical emphysema to occur **Action:** • Assess the patient • Check for kinks in the tubing • If a clot is seen in the tubing, gently squeeze or pinch the tubing between the fingers in the direction of the drainage device. If there is no improvement change the tubing • GET SENIOR HELP
15. Explore actions to be taken by the registered nurse if chest drain there is excessive bubbling in the system	**Cause:** Leak from chest drain connections or persistent air leak within the lung **Complication:** Unresolved pneumothorax **Action:** • Assess the patient • Check drain, connections and tubing • GET SENIOR HELP
16. Explore actions to be taken if the tubing becomes	**Cause:** Connections not adequately secured

Assessment Criteria	Minimum knowledge and/or skill
disconnected	**Complication:** Air will enter the pleural space casing a worsening pneumothorax and/or tension pneumothorax **Action:** • Clamp tubing to prevent air entering the pleural space • Ask another member of staff to assess the patient • Replace with new tubing • Ask the patient to cough gently to remove air • GET SENIOR HELP
17. Explore actions to be taken if the chest drain falls out	**Cause:** Drain not secured **Complication:** Respiratory distress due to pneumothorax **Action:** • GET SENIOR HELP • If mattress suture present close the wound and apply an occlusive dressing • Assess patient • Prepare for a chest drain insertion
18. Explore actions to be taken if there is a sudden increase in drainage	**Cause:** Drain previously blocked or thoracic bleeding **Complication:** Air will enter the pleural space casing a worsening pneumothorax and/or tension pneumothorax **Action:** • IMMEDIATELY GET SENIOR HELP • Assess the patient • >1500ml loss of blood or 200ml/hour may indicate the need for a thoracotomy
19. Explore actions to be taken if there is a sudden lack of drainage	**Cause:** The lack of drainage may indicate that the drain is blocked or kinked **Complication:** Tension pneumothorax **Action:** • Assess the patient • Check the entire system for kinks and obstructions

Assessment Criteria	Minimum knowledge and/or skill
	• Straighten the tube • If unresolved GET SENIOR HELP
20. Explore actions to be taken if the eyelet holes of the chest drain are exposed	**Cause:** Chest drain has moved **Complication:** Respiratory distress due to pneumothorax **Action:** • GET SENIOR HELP • Cover the tubing with an occlusive dressing • Assess patient
21. Explore actions to be taken if the patient complains of pain	**Cause:** Drain pulling at site, immobility, pneumothorax or chest drain blocked **Complication:** Hospital acquired pneumonia, stiff shoulder, tension pneumothorax and/or respiratory distress **Action:** • as for 14 • Assess patient • Review and adjust analgesia • Refer patient to the physiotherapist
22. Explore actions to be taken if the patients becomes breathlessness with a drop in O2 saturations (SpO2)	**Cause:** Increasing dyspnoea, increased heart rate, lowered blood pressure & low oxygen saturation - may signify recurrent pneumothorax (after drain removal) or insufficient drainage or tube blockage **Complication:** Respiratory and cardiac arrest **Action:** Call for help Check drainage system High flow O_2
23. Demonstrates the ability to remove a chest drain	As per policy