



# Chest Drains - Guidelines for the Insertion and Management in Adults

This procedural document supersedes: PAT/T 29 v.3 – Guidelines for the Insertion and Management of Chest Drains



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## Amendment Form

Please record brief details of the changes made alongside the next version number. If the procedural document has been reviewed **without change**, this information will still need to be recorded although the version number will remain the same.

Version	Date Issued	Brief Summary of Changes	Author
Version 3	27 Sept 2021	<ul style="list-style-type: none"> <li>• Major changes have been made throughout and it is recommended that you read this document in full</li> <li>• Reviewed and formatted policy in line with CORP/COMM 1 v.7 – Development and management of procedural document within the Trust</li> </ul>	Dr D Trushell-Pottinger Sister Dawn Murray
Version 2	17 July 2017	<ul style="list-style-type: none"> <li>• Major changes have been made throughout and it is recommended that you read this document in full.</li> <li>• Reviewed and formatted policy in line with CORP/COMM 1 v.6 – Development and Management of Procedural Documents within the Trust</li> </ul>	Dr T J Noble Laura Di Ciacca
Version 1	August 2007	This is a new procedural document, please read in full	Laura Di Ciacca Dr Martin Highcock

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## 1. INTRODUCTION

The British Thoracic Society Guidelines (BTS) for the insertion of a chest drain state that in current practice chest drains are used in many different hospital settings and doctors in most specialties need to be capable of their safe insertion. Incorrect placement of a chest drain can lead to significant morbidity and even mortality (Griffiths 2005).

The National Patient Safety Agency Rapid Response Report (NPSA/2008/RRR003) confirmed that problems, including deaths have occurred nationally in relation to chest drains. Locally there is evidence of mis-management of chest drains and possible harm.

These guidelines are aimed at the insertion and management of chest drains in the adult patient in a hospital environment. The scope of this guidance does not cover children or any other pleural procedure.

A chest drain is a tube inserted through the chest wall between the ribs and into the pleural cavity to allow drainage of air (pneumothorax), blood (haemothorax), fluid (pleural effusion) or pus (empyema) from the chest. Effective drainage from the pleural space requires an adequately positioned drain and a one-way drainage system. This allows the pleural contents to drain and allows re-expansion of the lung. In the case of a pneumothorax or haemothorax this helps restore haemodynamic and respiratory stability by optimising ventilation/perfusion and minimising mediastinal shift.

## 2. PURPOSE

The purpose of these guidelines is to ensure a safe system for the insertion and management of chest drains in adult patients by

- improving the decision-making for the patient who may require a chest drain
- ensuring that chest drains are inserted correctly by trained individuals who have demonstrated and evidenced competence
- ensure the use of a pleural procedure check list is used based on BTS/WHO guidance
- ensuring that patients are cared for on wards with appropriately trained nurses who are familiar with chest drains.

## 3. DUTIES AND RESPONSIBILITIES

### 3.1 Medical Director

It is the responsibility of the Medical Director to identify a lead for training of all staff involved in chest drain insertion and management as per National Patient Safety Agency guidance.

### 3.2 Lead for training

It is the responsibility of the Lead for training to ensure that all staff involved in the insertion and management of chest drains have access to appropriate training (section 5). Where relevant, individual care groups will have identified leads in their specific area, eg Medicine, Emergency Department, Surgery, Orthopaedic, Paediatrics.

### 3.3 General Manager

It is the responsibility of the General Manager to work with the Matron and ward managers to ensure provision of appropriate equipment for the insertion and management of chest drains.

### 3.4 Consultant

As the professional with overall clinical responsibility for the patient, the Consultant will ensure that all medical staff are aware of these guidelines, that clinical standards are maintained and any necessary deviation from this guidance is documented and explained in the clinical notes. It is the Consultant's responsibility to identify adequately trained staff to perform the procedure.

### 3.5 Matron/Ward Managers

It is the responsibility of the Matron/Ward Managers to ensure that

- all nursing staff are aware of these guidelines
- all nursing staff are competent to undertake their role in relation to the insertion and management of patients with chest drains
- all nursing staff have access to the appropriate training
- any adverse incident reported that relates to the insertion and/or management of patients with chest drains is investigated and action plans developed to prevent their future occurrence.

### 3.6 All clinical staff

It is the responsibility of each member of staff involved in the insertion and management of chest drains:-

- to comply with the standards set out in these guidelines
- to ensure they adhere to the training requirements set out in these guidelines
- to work within their own training and competence and seek advice where necessary
- to report all chest drain issues (including near miss events) using the Trust's Incident Reporting procedures

These issues should be discussed at relevant Care Group Clinical Governance meetings and any identified actions resulting from incidents implemented.

## 4. PROCEDURE

### 4.1 Indications for Use

Identification of the indication for a drain may be made by a combination of context (pathology, mechanism of injury), clinical examination and radiological imaging which may include CT or ultrasound for fluid.

Pneumothorax

- Spontaneous pneumothorax – insertion of chest drains should follow latest British Thoracic Society Guidance available on their website.

- Not all spontaneous pneumothoraces require insertion of a chest drain, some can be managed conservatively or by simple aspiration as per BTS guideline. If in doubt after consultation of the latest BTS guidelines, discuss with senior medical team member. This is typically the medical registrar on-call or Respiratory referrals consultant in hours.
- In secondary spontaneous pneumothoraces the differential diagnosis between a pneumothorax and bullous disease requires careful radiological assessment sometimes requiring CT scanning. If the patient is haemodynamically stable without oxygen requirement, there is time to seek specialist advice.
- Traumatic pneumothorax – insertion of chest drains should follow latest ATLS (Advanced Trauma and Life Support) guideline.
- Tension pneumothorax – should be treated immediately with advice from the most senior team member available. After initial decompression with a small bore cannula a chest drain will normally be required.
- Iatrogenic pneumothorax eg following insertion of a central venous catheter, insertion of chest drains should follow latest British Thoracic Society Guidance.

In ventilated patients or those in whom invasive or non-invasive ventilation is planned, a pneumothorax should normally be managed with a chest drain. In some circumstances where close monitoring is assured then a drain may be deferred by the senior decision maker.

#### Pleural fluid

- Traumatic – insertion of a chest drain for a haemopneumothorax or haemothorax should follow ATLS guideline.
- Non-traumatic – if drainage is necessary the insertion of a chest drain should follow the latest British Thoracic Society Guidance
- Peri-operative chest drains eg. thoracotomy, oesophageal surgery, cardiothoracic surgery, thoracoscopy, will be inserted by the operating clinician

## 4.2 Insertion of a Chest Drain

**A more detailed practical guide to the insertion of chest drains is included in Appendix 1.**

Personnel involved in the insertion of chest drains should be adequately trained with relevant competencies and appropriate supervision, see section 5.

Insertion of drains for fluid should generally be avoided out of normal working hours. If necessary for urgent symptom control, then consideration should be given to aspirating up to 1 litre of fluid for comfort. Specific 6 french, therapeutic aspiration kits are available on the respiratory unit for this procedure.

In Medicine during normal working hours the need for a chest drain will be a Consultant-led decision. If a drain is being considered, patients should normally be discussed with the Respiratory Consultant or Respiratory registrar in the first instance.

Out of normal working hours, medical patients should be discussed with the on-call medical Specialist Registrar.

In Surgery the need for a chest drain in hours will be discussed with the responsible consultant and with the surgical Middle grade out of hours.

In the Emergency Department (ED) the need for a chest drain in hours will be discussed with the responsible consultant and with the ED Middle grade out of hours.

Insertion of a chest drain in an emergency situation will be the responsibility of the most experienced senior member of staff available at the time.

#### **4.3 Before Insertion of the Chest Drain**

Clinical assessment should take into consideration risk factors associated with insertion of a chest drain eg. clotting. Although there is no published evidence that abnormal blood clotting or platelet counts affect bleeding complications of chest drain insertion, it is good practice to correct any coagulopathy or platelet defect prior to drain insertion.

Ultrasound guidance is now considered mandatory for intervention of pleural fluid, with the majority of this performed by respiratory physicians. Thoracic ultrasound skills has now also become part of the skill set of a number of other medical specialties. However, if an appropriately trained medical doctor is not available this should be arranged with the diagnostic imaging department.

#### **4.4 Location**

For ward-based procedures the drain should ideally be inserted in a treatment room or procedure room. A trained nurse should be present during the procedure.

#### **4.5 Consent**

The National Patient Safety Agency advises that where possible, written evidence of consent is obtained before the procedure. Consent when obtained should be documented as per the Trust Consent Policy PAT/PA2.

The identity of the patient should be checked and the site for insertion of the chest drain confirmed by reviewing the clinical signs and the radiological information. The pleural procedures check list based on BTS/WHO recommendation should be completed for all pleural procedures (see appendix 3).

#### **4.6 Aseptic Technique**

All drains should be inserted with full aseptic precautions as per the guidance outlined in the Royal Marsden Manual of Clinical Nursing Procedures (2015).



#### 4.7 Pre-medication and Local Anaesthetic

Chest drain insertion is often reported to be a painful procedure. Pre-medication with analgesics should be considered.

Effective local anaesthesia is essential using up to 3mg/kg of Lidocaine. As a guide, this equates to a maximum of 18mls of 1% for a 60kg patient. Dose should not exceed 200mg (20mls of 1%) if given in isolation. Please consult latest BNF advice on dosage if unsure.

If sedation techniques are being used, the procedure should be performed with appropriate monitoring and resuscitation equipment immediately available in the presence of a senior member of staff with advanced airways training.

#### 4.8 Equipment

All equipment required to insert a chest drain should be available before commencing the procedure. Standardised chest drain equipment is available in order to maximise familiarity.

Chest drain tubes are available in a range of sizes suitable for a variety of purposes (typically 8-36Ch) and may be inserted via an open surgical incision (thoracostomy) or via the Seldinger technique, using a guide wire and dilator technique.

Spontaneous pneumothoraces and non-viscous effusions can be drained using relatively small calibre drains (8-12Ch) as they are shown to be effective and better tolerated. These can normally be inserted using the Seldinger technique.

Traumatic pneumothoraces, haemothoraces and some empyemas may need larger chest drain tubes and can require an incision and dissection technique.

The majority of situations can be treated with a 12-18 French Seldinger drain. Size 28 French Seldinger drains are also available on the respiratory ward. Chest drain packs should be available in ED, Respiratory or Acute Medical Admission wards. If you are unsure of which drain size to pick, speak to a senior medical colleague or senior respiratory doctor for support. These packs contain:

- Seldinger chest drain and insertion kit
- Sterile field
- Surgical gown and sterile paper towel for hand drying
- Chest drain dressing

In addition to the kit you will require:

- Skin cleaning solution
- Local anesthetic
- Gloves
- Sutures

## 4.9 Inserting the Drain

The position of the drain is determined by the location and the nature of the collection to be drained. The 5<sup>th</sup> intercostal space in the mid-axillary line is generally used for most situations. This area is commonly known as the “safe triangle”, bordered by the anterior border of latissimus dorsi, the lateral border of the pectoralis major, a line superior to the horizontal level of the nipple and an apex below the axilla. The drain should pass over the superior surface of a rib to reduce risk of injury to the intercostal vessels and nerves that run below the inferior border of the ribs.

Any other placement should be discussed with a senior clinician eg. in the presence of an apical pneumothorax, when placement of a chest tube in the 2<sup>nd</sup> intercostal space should be considered. A loculated effusion will normally require image guided insertion.

During the procedure aspiration of fluid or air is essential to confirm that the instrument is in the pleural space. If fluid or air is not aspirated, the procedure should not proceed and further help should be sought possibly with radiological support. The chest tube should be placed into the pleural cavity avoiding the use of significant force.

All of the fenestrations (holes) in the drain need to be in the pleural cavity for the drainage system to work effectively. If drain fenestrations are situated within the subcutaneous tissues, air or fluid may escape into the tissues and cause surgical emphysema or collections of potentially infected fluid. Surgical emphysema is the abnormal presence of air within the subcutaneous tissues. Its presence suggests that the drain is occluded or misplaced. Alternatively it may indicate that the drainage system is inadequate to deal with the degree of air leak. Following senior respiratory advice the rate of drainage can be increased by applying suction, inserting a second drain or using a larger bore tube.

All drains inserted should be connect to the drainage system with the addition of a 3-way tap. This is placed between the chest drain catheter inserted into the pleural space and the drainage tube which is connected to the drainage system. This allows for drains to be flushed, clamped and administration of intra-pleural therapeutics if required.

## 4.10 Securing the Chest Drain

Chest drains should be secured with at least one large sutures eg 1/0 silk, anchored to the skin and to the drain with a suitable tight non-slip knot technique. This should prevent excessive travel of the drain in and out of the chest wall. If necessary any skin incision can be closed on each side of the chest tube usually with one 2/0 silk suture each side. The operator needs to be able to tie sutures securely. Modified techniques may be used if approved by Consultant staff skilled in the insertion and management of chest drains.

Purse string sutures should be avoided as they convert a linear wound into a circular wound which can be painful and leave an unsightly scar.

#### 4.11 The Drainage System

Once the drain is adequately inserted it should be secured in place and connected to an appropriate closed drainage system. The drainage system of choice will be determined by the clinical indication for insertion.

- Passive drainage system

This is an underwater seal drainage system which employs positive expiratory pressure and gravity to drain the pleural space. The drainage tube is submerged in the water of the reservoir or collection chamber. This ensures minimum resistance to drainage of air and maintains the underwater seal even in the face of a large inspiratory effort. The underwater seal acts as a one-way valve through which air is expelled from the pleural space and prevented from re-entering during the next inspiration. Retrograde flow of fluid may occur if the collection chamber is raised above the level of the patient's chest and therefore the collection chamber should be kept below the level of the patient's chest at all times. If the drainage chamber is knocked over the underwater seal will be lost and air can pass back up the tube during inspiration. On setting up the current drainage system, 45 mls of sterile water needs injecting in the underwater seal port. The fluid will mix with a blue dye to make visibility of the fluid easier. Non rigid bladder drainage systems **should not be used** as maintaining a positive expiratory pressure difference between the pleural space and the drainage reservoir is not possible.

- Portable valve systems

These can be used for patients with on-going air leaks or fluid drainage. These are based on a one-way flutter system which may be advantageous, as resistance to airflow is generally lower than conventional underwater seal systems.

#### 4.12 Dressings

Purpose designed dressings should be used. Dressings should allow site inspection. Large amounts of tape and padding to dress the site are unnecessary. Appropriate dressings for each drain are found in the complete chest drain packs. Size 12 French and 18 French Seldinger drain packs can be found in ED, Respiratory or Acute medical admission wards.

An omental tag of adhesive dressing tape may be used to support the tubing and protect it against being pulled out.

Dressings should be changed for the following reasons:-

- to enable the insertion site to be monitored for signs of infection. A swab should be taken from the chest drain site if there are any clinical signs of infection
- to monitor for surgical emphysema
- to ensure the chest drain remains well placed and the anchor suture is intact.

#### 4.13 Following insertion of the chest drain it is essential to :-

- confirm that, if used, the Seldinger insertion wire has been removed

- check the drain functions by observing for bubbling in a pneumothorax or flow of fluid in an effusion.
- order a repeat chest x-ray to confirm the position of the tube and the degree of lung re-expansion and to exclude any complications (for example retention of insertion wire)
- advise the patient to keep the drainage bottle upright and below the drain insertion site and to avoid compression of the tube
- ensure analgesia is prescribed as required
- ensure all sharps are disposed of in accordance with the Trust Sharps Policy – Safe Use and Disposal PAT/IC 8
- document the procedure in the relevant section of the medical and nursing records as per Trust guidance. The batch number of the chest tube and drainage system, the position of insertion, the removal of the wire, the number of sutures and the length of the tube inserted should all be documented.

Any changes to the chest drain or drainage system following initial insertion should be clearly documented.

#### 4.14 Escalation Process for Raising Concerns

If any concern is raised regarding the procedure, eg confirmation of removal of the insertion wire, this must be escalated immediately to the senior clinician responsible for the patient's care. If there is doubt about the location of the wire then radiological confirmation must be obtained immediately with appropriate management according to findings.

#### 4.15 Monitoring/Recording

A Trust Chest Drain Observation Chart should be commenced for every patient with a chest drain. As the time of publication the Chest Drain Observation Chart remain on paper forms, but will be transferring to digit documents on Nerve centre towards the end of 2021. The frequency of routine monitoring observations depends on clinical presentation, progress and medical request, but should normally happen hourly for the first 4 hours and then 4 hourly thereafter, as per the Trust's Physiological Observation: Policy for Adult In-Patients in Acute Hospitals (PAT/T33).

In addition to the "Routine monitoring", the following parameters should also be monitored

- swinging or oscillation of the water level in the drainage tube with respiratory cycle
- bubbling of the drain in pneumothorax
- volume and type of fluid drainage collected in the bottle
- whether clamped or not (3-way taps in the "off" position should be documented as clamped)
- the state of the drain site eg whether appears infected or leaking fluid or air
- the state of the tubing
- inspection of the drain site and tubing to ensure that all connections are secure and that the underwater seal remains functional (i.e. the water level is adequate and that the bottle is upright and below the level of the chest)

- whether suction is applied and if so – how much (kpa). If suction is turned off ensure that the suction tubing has been disconnected
- date and time of bottle change.

Fluid within the tube should swing with respiration due to changes in intra-pleural pressure. With normal respiration, the fluid should rise on inspiration and fall on expiration.

Bubbling and swinging are both dependant on an intact underwater seal and a patent tube. It is important that the drain tube extends below the water level in the bottle. Bubbling and swinging should be assessed with the patient deep breathing and if possible coughing. This also has the benefit of assessing adequacy of analgesia. These features indicate that the drain is still functional.

Absence of swinging indicates that the drain is occluded or is no longer in the pleural space. It may be necessary following clinical assessment and unsuccessful flushing of the drain to obtain a chest x-ray to determine the underlying cause.

Bubbling in the underwater seal fluid chamber generally indicates an on-going air leak which may be continuous, present on one phase of spontaneous ventilation or only on coughing. Faulty connections and entrained air through the skin incision should also be considered.

Drains inserted just for fluid alone should not bubble, so the presence of this feature is abnormal and should be recorded and referred for medical review. Any sudden increase in volume drained should also be referred for immediate medical review.

A drain inserted for drainage of a haemothorax with or without pneumothorax needs the blood loss to be recorded accurately, with any sudden increases in drain volume referred immediately for medical review.

With fractured ribs most bleeding is from the intercostal vessels, which slows down as the lung reinflates. However continued bleeding into the drain bottle is indicative of pathology that may need thoracic surgical intervention.

Small bore drains may need to be flushed regularly with normal saline to ensure patency. The flush should be prescribed and carried out by appropriately trained personnel.

#### **4.16 Changing the Drain Bottle**

Drains inserted for fluid may require the drain bottle to be changed as a full bottle will restrict any further drainage. This is best done as a planned activity and should be anticipated when the bottle is  $\frac{3}{4}$  full. Staff trained in changing the drain bottle should use an aseptic technique to briefly clamp off the drain, remove the old bottle and replace with the prepared new bottle, ensuring the underwater seal is working. The drain should be unclamped as soon as the connections are made. The full drain bottle should be disposed of in accordance with the appropriate policy.

#### 4.17 Complications

The following potential complications should be considered

- pain
- injury to intercostal vessels
- perforation of other vessels
- haemorrhage
- organ injury/damage
- incorrect placement (extrapleural, in the fissure, fenestrations (drainage holes) outside the pleura, tube kinked)
- rapid shifts in pleural pressure
- pleural/wound infection
- procedure failure

Large pleural effusions should not be allowed to drain rapidly. The rapid shift in pleural pressures and re-expansion of the previously collapsed lung can cause re-expansion pulmonary oedema, a potentially fatal complication. Fluid should be drained slowly and no more than 1-1.5 litres of fluid allowed to drain before the tube is clamped/3-way tap turned to the “off” position. If the patient starts to cough or complains of chest pain before this point is reached, drainage should be stopped immediately by clamping or turning off the 3-way tap. Drainage may be cautiously resumed no fewer than 2 hours later. Any remaining fluid should be drained 1.5 litres at a time at 2 hourly intervals, stopping if the patient develops further chest discomfort, persistent cough or vasovagal symptoms. Re-expansion pulmonary oedema is a well-described serious, but rare complication following rapid expansion of a collapsed lung through evacuation of large amount of pleural fluid on a single occasion and the use of early and excessive pleural suction.

#### 4.18 Advanced Management of the Chest Drain and Drainage System

##### Clamping Chest Drains

Drains inserted for fluid drainage can be clamped/3-way taps turned to “off” position, to control drainage rate as necessary. However, as a general rule chest drains for pneumothorax should not be clamped. In the presence of a continuing air leak clamping may result in a tension pneumothorax or possibly worsening surgical emphysema.

Exceptions to this include brief clamping to change the bottle.

If a chest tube is clamped it should be under the direct supervision of a respiratory physician or surgeon on a ward with experienced nursing staff. A patient with a clamped tube should not leave the specialist ward environment. Instructions should be left that if the patient becomes breathless or develops surgical emphysema, the chest tube must be unclamped immediately and the medical team alerted.

#### 4.19 Suction

A patient who is free from pain, to the degree that an effective cough can be produced, will generate a much higher pleural pressure differential than can safely be produced with suction. This combined with a functional underwater seal will result in re-inflation of the lung. If a patient cannot re-inflate their own lung or persistent air leak is preventing re-inflation, **high volume-low-pressure** thoracic suction in the range of 10-20cmH<sub>2</sub>O should be used. The decision to use suction is the responsibility of a specialist in respiratory medicine. Purpose made low pressure suction units should be used when applying suction to a chest drain. High volume, low pressure suction units are available from Respiratory Wards.

Standard high-pressure suction units must NEVER be used.

Suction that is not working properly or is turned off without disconnecting from the drain bottle is the equivalent to clamping a drain. So when suction is no longer needed it should be disconnected from the drainage bottle.

The use of suction may cause continuous bubbling from the tube; swinging of fluid in the tube may not be visible.

#### 4.20 Analgesia

An indwelling chest drain can be painful and adequate analgesia should be prescribed and given as required.

#### 4.21 Removal of the Chest Drain

Following clinical assessment by an experienced doctor, the chest drain may be removed by those with appropriate training. The timing of this is dependant on the original reason for insertion and clinical progress.

Adequate pain relief should be ensured before removal of the chest drain.

Aseptic technique should be used for removal and the chest drain and the drainage equipment disposed of appropriately.

When the tube is ready to be removed, the anchor suture is cut and the patient should be asked to perform a Valsalva manoeuvre (to increase the pleural pressure and prevent air entering the pleural cavity) and the tube can then be swiftly withdrawn. If present the previously placed suture is then tied to close the skin. Wounds from small bore drains may not need suturing for closure.

The wound site should be checked, condition documented and an appropriate dressing applied.

A repeat chest x-ray should be performed following removal of the chest drain to ensure resolution of the original pathology.

If a suture is required post drain removal, you must ensure a plan for suture removal at day 10 is made. This may result in the suture removal after discharge from hospital. If this is the case, district nursing teams are typically able to support the removal of the suture(s).

## 5. TRAINING/ SUPPORT

The training requirements of staff will be identified through a training needs analysis for each specific area where chest drains are used. Role specific education will be delivered by the service lead.

It is the responsibility of any member of staff involved in the insertion and/or management of chest drains to identify training needs and ensure they undertake training as appropriate.

As per the National Patient Safety Agency RRR03 guidance (2008), the Trust has an identified lead for training of all staff involved in chest drain insertion. Achievement of competence will be evidenced by a work place based assessment in the form of a Directly Observed Procedural Skill (DOPS) for chest drain insertion, which may have been acquired prior to employment at the Trust.

Training opportunities for Seldinger chest drain insertion are available for medical staff via the clinical skills laboratory and supervised clinical experience is available. Large bore chest drains for trauma are to be inserted using ATLS standard procedure and training.

All nursing staff involved in the management of chest drains should access the Respiratory Unit Chest Drain competency training.

Staff may also access the Chest Drain training on the Junior Doctor Respiratory Teaching Programme.

In addition the following training opportunities are available within the Trust

- RAMSI (Recognition and Management of the Seriously Ill Patient)
- TILS (Trauma Intermediate Life Support) for staff working in the Emergency Department

Training should be carried out in accordance with the Medical Equipment Training for Trust Staff Policy (CORP/RISK 2).



## 6. MONITORING COMPLIANCE WITH THE PROCEDURAL DOCUMENT

Criteria	Monitoring	Who	Frequency	How reviewed
Audit 10 cases per year	Clinical Audit	Junior doctor/ trainee	Annually	Emergency Care Group Clinical Governance/Audit Meeting  Trust Respiratory Unit Meeting
Datix reporting	Via relevant Clinical Governance forums	Ward managers/ Matron	On receipt of the adverse incident	Emergency Care Group Clinical Governance Meeting  Trust Respiratory Unit Meeting
Complaints/Claims	Via relevant Clinical Governance forums	Ward managers/Matron	On receipt of the complaint/claims	Emergency Care Group Clinical Governance Meeting  Trust Respiratory Unit Meeting

## 7. EQUALITY IMPACT ASSESSMENT

An Equality Impact Assessment (EIA) has been conducted on this procedural document in line with the principles of the Equality Analysis Policy (CORP/EMP 27) and the Fair Treatment for All Policy (CORP/EMP 4).

The purpose of the EIA is to minimise and if possible remove any disproportionate impact on patients on the grounds of race, sex, disability, age, sexual orientation or religious belief. No detriment was identified.

A copy of the EIA can be found in Appendix 2.

## 8. ASSOCIATED TRUST PROCEDURAL DOCUMENTS

- Consent to Examination or Treatment Policy (PAT/PA2)
- Policy for the Reporting and Management of Incidents and Near Misses (CORP/RISK 13)
- Equality Assessment Policy (CORP/EMP 27)
- Hand Hygiene Policy (PAT/IC 5)
- Central Alerting System Policy (CORP/RISK 6)
- Medical Equipment Training for Trust Staff (CORP/RISK 2)
- Mental Capacity Act 2005 Policy and Guidance, including Deprivation of Liberty Safeguards (DoLS) (PAT/PA 19)
- Physiological Observations and prevention of deterioration in the acutely ill adult (PAT/T 33)
- Privacy and Dignity Policy (PAT/PA 28)
- Sharps Policy – Safe Use and Disposal (PAT/IC 8)
- Standard Infection Prevention and Control Precautions Policy (PAT/IC 19)
- Serious Incidents (SI) Policy (CORP/RISK 15)
- R09 Inserting a Chest Drain Patient information (Eido Healthcare)

## 9. REFERENCES

Laws D, Neville E, Duff J. British Thoracic Society guidelines for the insertion of a chest drain. *Thorax* 2003;58 (Suppl II):ii53-ii59

Griffiths JR, Roberts N. Do junior doctors know where to insert chest drains safely? *Postgrad Med J* 2005; 81: 456–458. CrossRef, Medline

National Patient Safety Agency Rapid Response Report (NPSA/2008/RRR003) Risks of chest drain insertion

BTS Pleural Disease Guideline 2010

The Royal Marsden Manual of Clinical Nursing Procedures (2015)

British Thoracic Society Training Standards for Thoracic Ultrasound (TUS) (December 2019)

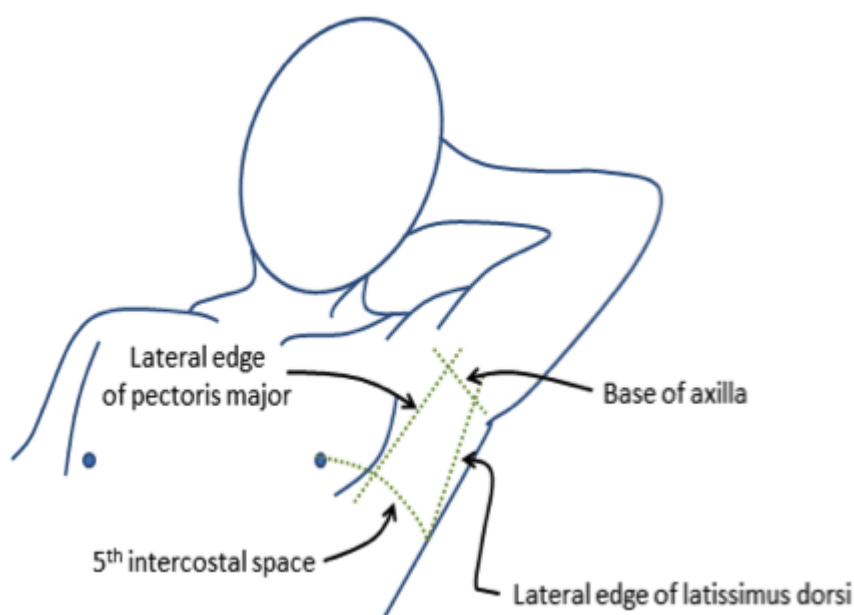
## APPENDIX 1 – CHEST DRAINS – DETAILED DESCRIPTION OF INSERTION TECHNIQUE

### Pre procedure checks

Many checks are required to minimise the risk to patients when inserting intercostal chest drains.

1. Clarify the indication and clinical need for drain insertion
  - a. Clinical assessment of underlying pathology / process
  - b. Imaging that confirms diagnosis. Bedside Thoracic Ultrasound is mandatory for the treatment of pleural fluid.
  - c. Out-of-hours chest drain insertion is usually not required (especially for pleural effusions) with the exception of clinical instability and severe symptoms.
  
2. Review the presence of contraindications to chest drain insertion
  - a. Differentiate between bullous lung disease and pneumothorax carefully: seek radiological advice where there is uncertainty.
  - b. Differentiate between lung collapse and pleural effusion where a "white-out" is seen on chest radiograph. Again seek out radiological advice where there is uncertainty
  - c. Lung densely adherent to the chest wall is a contraindication and would require specialist respiratory input prior to drain insertion.
  
3. Review the presence of risks and complications prior to insertion
  - a. Review blood tests to assess for risk of haemorrhage. If there is any abnormality, the insertion of the drain should be delayed, or consider correction of abnormalities by giving platelet transfusion cover and clotting factors as required.
  - b. Patients with previous cardiothoracic surgery, in particularly pneumonectomy, requiring chest drain insertion should be managed by, or be consulted with the cardiothoracic surgeons or the respiratory team.
  
4. Patients must give their consent for intercostal drain insertion, by fully explaining the procedure listing the benefits and risks of the procedure as per national policy. See patient information sheet R09
  - Complications for intercostal drain insertion include pain
  - injury to intercostal vessels
  - perforation of other vessels
  - haemorrhage
  - organ injury/damage\*
  - incorrect placement (extrapleural, in the fissure, drainage holes outside the pleura, tube kinked)
  - rapid shifts in pleural pressure
  - pleural/wound infection
  - procedure failure
  - Death (less than 1 in 1000)\*

- a. \* denotes the most serious complications that are uncommon but must be discussed.
  - b. Consent should be obtained in written format, except in emergency circumstances.
5. Insertion of an intercostal drain can be very uncomfortable therefore consideration of analgesia is required.
- a. Consider giving suitable pre-procedure analgesia
  - b. Give regular and PRN break-through analgesia post-procedure
  - c. Consider the use of conscious sedation in patients who request it or it is appropriate for, and follow best practice guidelines (Academy of Royal Colleges guidance). Ensure appropriate monitoring and resuscitation equipment is available.
6. Selection of the insertion site for intercostal drains should be considered carefully before insertion. The position for drain insertion is also dependent on the underlying pathology (pneumothorax or effusion).
- a. Knowledge of the safe triangle is important, especially for insertion of drains for pneumothorax without ultrasound.
  - b. The safe triangle is bordered anteriorly by the lateral edge of pectoralis major, laterally by the lateral edge of latissimus dorsi, inferiorly by the line of the fifth intercostal space and superiorly by the base of the axilla



- c. In cases where ultrasound is available, particularly in localised pleural effusions, the safe triangle position may not be appropriate. The use of bedside Thoracic Ultrasound is mandatory for the treatment of pleural fluid.
  - d. Ensure radiological / qualified ultrasound operator opinion is sought for safety reasons.
7. The patient's own position is important, and their position will depend on the reason for insertion and their clinical state

- a. Most commonly, the patient should be lying at 45-degree angle with their arm raised behind their head exposing the safe triangle.
  - b. Other positions include the patient lying on their side with the affected side uppermost, or supine in trauma patients.
  - c. In patients with pleural effusions, sitting up and leaning forward over a high table with elbows supported can be appropriate if imaging allows a safe approach.
8. Insertion of an intercostal drain should take place in a dedicated clinical area and not at the bedside where ever possible. Extra precautions need to be taken if inserted at the bedside. Ensure precautions are taken to ensure the workspace is clean, clutter-free, appropriately spacious and private: ideally a side-room.
  9. Drain size is important to consider. Small drains are more comfortable. Whilst there is little evidence regarding therapeutic superiority, thick pleural effusions drain better with larger bore drains, and minimum size of a 12 French drains are required for pleurodesis of effusions, particularly for those with malignant pleural effusions. Small pigtail drains, although useful in effusion drainage, should be avoided where pleurodesis or other intra-pleural therapeutic may be required. You may need to send your preferred drain with the patient, if to be inserted by radiology.
  10. All drains should have a 3-way tap connected between the chest drain catheter and the drainage system tube where possible. These are available in all Seldinger chest drain packs.
  11. Normally an additional member of staff would be present to assist with some aspects of insertion. This may be particularly helpful to ensure appropriate checks are carried out. The operator should instruct the observing assistant in what to assess, eg aseptic technique, guidewire removal, sharps safely collected.

### Ultrasound

It is now consider mandatory for the treatment of pleural fluid that bedside thoracic ultrasound should be used by an appropriately trained healthcare worker. This training is set out in the British Thoracic Society Training Standards for Thoracic Ultrasound 2019.

### Radiology mark and return to the ward

It is no longer acceptable practice for a patient to be “marked” by radiology and returned to the ward / clinical area for a clinician to perform a drain insertion. Bedside thoracic ultrasound is now mandatory for the treatment of pleural fluid at the point of drain insertion.

### Clinician performed drain insertion with live radiology support

1. If a clinician without appropriate thoracic ultrasound training is not available, the clinician should liaise with the ultrasound department and discuss the patient’s case.
2. Live ultrasound support is particularly useful in the case in patients with small, small to moderate or localised / loculated effusions.

3. The clinician who would be inserting the drain with the assistance of the sonographer / radiologist should be confident and competent to perform this procedure with such assistance.
4. The procedure should then be planned between the clinician and the sonographer / radiologist who will be co-performing the procedure.
  - a. A suitable room in the radiology department should be found
    - Fluoroscopy room
    - Ultrasound room
  - b. The clinician should be clear with the radiologist the level of input they require
    - Live support for insertion of the introducer and guidewire until fluid is aspirated and then the rest of the procedure carried out with no further ultrasound guidance.
    - The above but with support for the rest of the procedure if needed: aspiration fails to continue or there are other concerns regarding position.
    - Live support for the entirety of insertion.
  - c. It is the responsibility of the clinician to ensure all pre-procedure checks are made before insertion is carried out as per the BTS/WHO check list.
  - d. The indication should be clear as should the urgency for insertion
  - e. To ensure all equipment is available for the procedure, including oxygen, monitoring equipment and resuscitation equipment.  
Chest drainage equipment should either be provided from the ward where the patient is currently resident if appropriate equipment is not available as stock in radiology.
  - f. A suitably qualified professional should be present during insertion to assist: a trained nurse. There should also be such a person to transfer the patient back to their ward / care area.
5. An ICE request for USS pleural cavity and thorax will be required by radiology to complete this.
6. Ensure any fluid sampling that is required is agreed in advance to ensure adequate samples are collected

#### Radiologist performed drain insertion alone

1. The requesting clinician should discuss the patient with the radiologist who is on-call or will be performing the procedure. It should be clearly communicated with the radiologist what the indication of the drain insertion is, the urgency it is required in, the size drain and drain system required.
  - a. Chest drainage equipment should either be provided from the ward where the patient is currently resident or by the equipment stock in radiology.
2. This approach is most likely to be used in small effusions where treatment is required: empyema or loculated effusions with significant symptoms.
3. When an agreement is made, liaison with the department will need to be made regarding qualified assistant presence and suitable person to transfer the patient back to the ward / clinical area.
4. An ICE request for USS guided drainage of pleural cavity will be required with information pertaining to point 1 under this heading in the request.

5. Pig-tail drains should be avoided where possible as they limit the treatment options post procedure e.g. talc pleurodesis.
6. Ensure any fluid sampling that is required is agreed in advance to ensure adequate samples are collected

Liaison with the ultrasound department is extremely important, with clear communication required at all times. This is to reduce risk and harm to the patient and ensure that the correct procedure is carried out

When patients are transferred to radiology / ultrasound for drain insertion in their department arrangements must be made to ensure an appropriately qualified assistant for insertion of the drain, but also an appropriately qualified escort to bring the patient back to their ward / clinic area, such as a trained nurse.

### **Chest drain insertion procedure**

It is important, where possible to adhere to procedure to minimise risk. The Seldinger technique is the preferred choice on chest drain insertion in non-traumatic pneumothorax and pleural effusions.

Equipment needed (this is not exhaustive)

- 1 x Trolley
- 1 x other member of appropriate qualified staff to assist with insertion (eg. Staff Nurse)

Rocket Medical Seldinger Chest Drain Pack contains:

- 1 x Gown
- 1 x Sterile hand towel
- 1 x Fenestrated drapes
- 1 x Sterile dressing pack
- 2 x Packs of gauze swabs
- 1 x Orange Needle (23 g)
- 2 x Green Needle (18 g)
- 1 x drain fixation dressing
- 1 x Seldinger chest drain (various sizes – check)
  - Containing: introducer, 2 x 10ml syringe, graduated guidewire, blade, dilator(s), drain, three-way tap, drain collection adapter

In addition, you will require:

- 10ml Lidocaine 1 or 2%
- Sample bottles
- ABG syringe to allow for pH measurement of pleural fluid in the ABG machines
- Sterile Gloves
- Skin cleaning solution – alcohol with 2% chlorhexidine
- Sutures for external fixation 1 or 2 x 1/0 mersilk/ethilon suture
- 45ml of sterile water

1 x underwater drain system

Procedure:

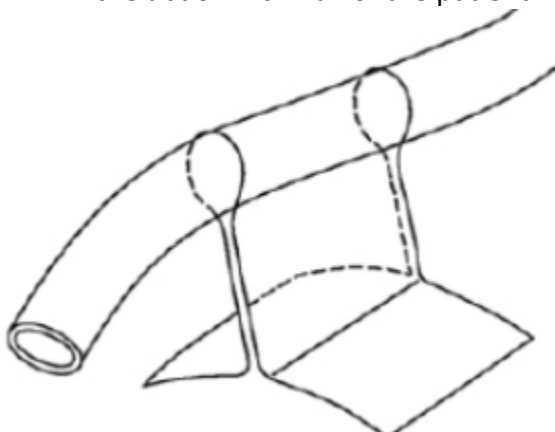
1. Discuss with the patient the indications of inserting the pleural drain, the benefits and risks and obtain consent as per Trust policy
2. Ensure all pre-procedure checks have been carried out: imaging has been viewed, bloods have been viewed and are deemed safe (See Pleural procedure check list)
3. For pleural effusions it is mandatory the bedside thoracic ultrasound is used to locate and characterise the fluid. If an appropriately trained clinician is not available, liaise with radiology.
4. Move patient into the appropriate room / environment for chest drain insertion. Ensure they are in the appropriate position and are exposed appropriately (the chest and back is fully exposed)
5. For a pneumothorax, ensure you are happy with insertion in the safe triangle.
6. Most importantly be happy with the position of the marking and palpate for site of insertion.
7. Clean trolley as per Trust policy
8. Open underwater drain system, aiming not to touch the connection to the drain in the process. With the 50ml syringe, pull the plunger out of the actual syringe, and discard the plunger. Then attach the remaining part of the syringe to the water-prime inlet of drain system to use as a funnel.
9. Open the sterile water and fill the syringe with the first 45ml of water and allow it to flow into the priming system. The fluid will turn blue and should meet the minimum fill line.
10. If not using an underwater drainage system, omit step 8 to 10, but ensure to prepare the drainage system as per their manufacturer's instruction eg. Portable valve systems like the Portex-system one-way flutter valve system.
11. Set up trolley by opening up either your Rocket medical chest drain pack (which will have much of the contents you need) or a sterile dressing pack, and aseptically open other items onto this.
12. Wash your hands as per Trust protocol, and use the sterile dressing towel to dry them before donning gown and gloves.
13. Using the cleaning solution poured into the gallipot, use skin preparation sponges and wash the patient's skin. Start at the point of insertion and work the sponge around in a spiralling-out motion to clean a large section of the chest wall. Repeat this again 1 more times.
14. Apply drapes. Ensure the fenestration lines up with marked area for drain insertion
15. Palpate area for insertion, ensuring correct location for insertion. Remember the need to insert the drain just above the rib, avoiding the neurovascular bundle.
16. Draw up 10ml of lidocaine 1% into a 10ml syringe via the drawing up needle. Ensure drug, strength and expiry date have been checked
17. Remove the needle and carefully place in an area of the trolley safe for sharps
18. Place the orange needle onto the syringe containing lidocaine and infiltrate the subcutaneous tissue in the area of insertion with lidocaine.
19. Replace the orange needle with the green needle, and after a minute or two insert the needle into the infiltrated area and insert the needle in a perpendicular direct approach into the pleural cavity. Ensure to aspirate and infiltrate local anaesthetic throughout.



20. When fluid or air is aspirated, the correct effusion or pneumothorax has been located. Make a mental note of the specific site and depth of the needle at this point. Remove the needle completely. Do not infiltrate contaminated local anaesthetic, use a second syringe if needed.
21. Using the introducer from the chest drain pack, attach the included 10ml syringe to the end, and move the small stopper marker on the needle of the introducer to a length equal to the depth the green needle was inserted to access the effusion / pneumothorax.
22. Insert the introducer down the same tract the anaesthetic needle made, aspirating all the time.
23. When fluid or air is aspirated again, advance a little further into the space then unscrew the 10ml syringe at the end of the introducer.
24. Thread the guidewire through the introducer into the pleural cavity, ensure all the wire comes out of its holder. It is paramount to keep hold of the guidewire **at all times** whilst it remains in the pleural cavity. A loose guidewire can be drawn into the pleural space with respiration and a lost guidewire is difficult to remove. The guidewire has marking to help the correct insertion length. A single black line denotes 10cm. 2 black lines denotes 20cm. 3 black lines denotes 30cm. Insert up to 3 black line point is reach (30cm). This leaves 30cm of the guidewire outside of the pleural space.
25. Remove the introducer, over the guidewire, ensuring the guidewire still enters the pleural cavity.
26. Using the blade, make a cut adjacent to the guidewire. Allow the cut to go through the subcutaneous tissue to allow appropriate widening of the tract.
27. Depending on the size of the chest drain desired, a number of dilators will be included in the chest drain pack. If only one dilator is included, only one is required. If more than 1 dilator is included in the pack, all dilators should be used, starting with the smallest diameter first. Use dilators in successive order of size from smallest diameter to the largest. The dilators have a large depth guard to reduce the risk of entering the pleural space too deeply. These guards can be removed if necessary if patient body habitus dictates, but this should only be done by a skilled operator. Insert the dilator over the guidewire. Using a twisting motion, carefully insert it through the tract, blunting dissecting the underlying muscle layer and pleura.
28. When the tract is appropriately dilated, withdraw the dilator over the guidewire. Then replace this with the drain which threads over the guidewire.
29. Ensure the natural curve of the drain is pointing downward in the case of an effusion and pointing upward in the case of a pneumothorax. Insert the majority of the drain into the pleural cavity, allowing for a small length outside which can be used to anchor it in place – essentially ensure all the holes in the drain are inside the pleural cavity. If too much drain remains outside the pleural cavity, causing fenestrations in the drain to be outside the cavity, leakage of air or pleural fluid can occur in the subcutaneous and cutaneous tissues (surgical emphysema).
30. Remove the guidewire through the end of the drain. Then remove the inner part of the drain which helps to stiffen the drainage tube.
31. Occlude the end of the drain with a gloved finger or thumb to prevent ingress of air or egress of pleural fluid.
32. Connect the three-way tap to the end of the drain in the closed position. Ensure the middle opening has the cap affixed.
33. Anchor the drain down with a suture, ensuring a 2-3cm width of skin is included in the suture loop. The suture material should be wrapped tightly around the tube and

frequent tight knots are tied off. Visible, but slight, indentations should be seen on the tube. Cut to tidy the ends of the suture.

34. Remove the fenestrated drape and place the drain fix dressing over the site of the drain insertion and secure the drain in place with this dressing. Aim to get the tube to run along the lateral edge of the chest and down the abdomen.
35. Connect the opposite end of the three-way tap to the underwater collection system via the adapter in the chest drain pack.
36. Using the omental tape technique, fix the tubing to the underwater collection system to the abdominal wall of the patient with the appropriate skin friendly tape.



37. Open the drain to allow drainage. Ensure swinging, bubbling in pneumothorax, and fluid drainage in effusion. Using the middle port of the three-way tap, a sample may now be aspirated for pathology specimens using a 50ml luer-lock syringe.
38. Debrief the patient, ensuring they understand the need to look after the drain, remembering to take it with them when they walk around the bed space and to contact a member of staff if they experience pain, or it has moved position or come out.
39. Also remember that the underwater collection system must be kept below the level of the waist to prevent fluid being siphoned back into the pleural space.
40. Debrief nursing staff about the insertion of the chest drain, instruct to perform chest drain observations, and to check the site at least daily for drain position, infection and surgical emphysema. If it is an effusion, adhere to when 1-1.5L of fluid has drained, the patient is given a two-hour break to prevent haemodynamic instability and re-expansion pulmonary oedema.
41. Clear away sharps as per Trust policy.
42. Make the appropriate documentation in the notes and prescribe appropriate analgesia for the patient. The patient will require a follow up chest x-ray to check the position of the drain and monitor complications such as pneumothorax in patients with effusion. **It is also important as a safety check to ensure that the guidewire is not still present in the drain or the chest.**

#### Important things to remember

1. Ensure you are appropriately trained to perform the procedure, and the decision of insertion is made by a consultant in-hours, and most senior clinician out-of-hours.
2. When infiltrating with local anaesthetic if no air or fluid is aspirated at this time, chest tube insertion should not continue without further imaging: it risks pneumothorax formation and other organ injury
3. Ensure patients drainage systems are correctly primed, attached and monitored.

4. When draining pleural effusions, no more than 1-1.5 litre of fluid should be allowed to drain before the drain is clamped and a two-hour break be given. If the patient exhibits cough, shortness of breath or chest pain, the drain should be immediately clamped and reviewed to see if a two-hour break is required.

### **Documentation standards**

On completion of the intercostal drain insertion, appropriate documentation should be made. This must include, but not limited to:

1. The indication for procedure and imaging obtained
2. That informed consent was obtained
3. The patient position
4. The position of site insertion
5. The use of ultrasound guidance for insertion (for pleural effusions)
  - a. Was the ultrasound clinician lead insertion?
  - b. Was it radiologist inserted with live ultrasound assistance?
6. Volume and concentration of lidocaine infiltrated, and the use of pre-medications and sedation
7. Technique used to insert the drain (Seldinger technique)
8. The ease of the procedure and patient tolerance
9. Document the size of drain inserted, its type and its batch / LOT number. Also document the length of tube left out after insertion.
10. Document that any introducing equipment has been removed eg. guidewire, trocar or stiffener.
11. Document the type of drainage system used/attached.
12. List complications (if any occurred) and their management
13. Document drainage plan and discuss ongoing management with nursing staff
14. Document result of proceeding chest radiograph to confirm drain position and complications

### **Post procedure management**

Patients that have had chest drain insertion will need to be managed by trained staff in an appropriate ward setting ie. respiratory ward, critical care area

When a drain has been inserted a Trust Chest Drain Observation Chart should be commenced. The frequency of observations should be at least every four hours, but more frequent as per the clinical situation (if a patient has a high early warning score or as instructed by the medical team).

When performing chest drain observations, the following needs to be noted:

1. The location of the chest drain – ensure it is below the patient
2. The position of the drain in the patient, paying attention to the length of chest tube outside the body. If this lengthens, the tube is at risk of dislodging and coming out and causing surgical emphysema
3. Is the chest drain swinging?

- Is fluid in the tube moving up and down with inspiration due to the change in thoracic pressure.
  - If there is no swinging, it could indicate the drain is blocked or is not positioned correctly
  - The patient should undergo clinical assessment, have their drain flushed (as it can be blocked by thick pleural effusions) and only when these have not determined the cause for the lack in swinging, a repeat chest radiograph should be requested to look at the position of the drain.
4. Is the chest drain bubbling?
    - Bubbling occurs when air from the pleural space is drained through the underwater system creating bubbles in the fluid chamber.
    - Bubbling should be observed both in inspiration and expiration, deep inspiration and expiration, and on coughing. Quite often it will only occur in deep expiration and coughing. Persistent bubbling into the tube throughout the respiratory cycle may indicate a bronchial-pleural air leak, faulty connections in the equipment or air entrapment through the incision site.
    - Drains inserted for pleural effusion should not bubble. Any that do require urgent medical review.
  5. The volume of pleural fluid draining from a pleural effusion should be documented. If there is an excessive amount of fluid draining, medical opinion should be sought to temporarily clamp or turn off the drain to prevent complications.
  6. Check for surgical emphysema around and above the site, particularly around the area of the neck. If there any signs, refer the patient for a medical review. Often these patients just need to be monitored for signs of respiratory distress and airway compromise.

#### Clamping chest drains

1. Chest drains inserted for pneumothorax generally should not be clamped. An actively bubbling chest drain must never be clamped. In doing so, a tension pneumothorax may occur, or worsening surgical emphysema.
2. Clamping of chest drains in pneumothorax should only be done under the care of a consultant respiratory physician or consultant surgeon and experienced nursing staff. If the patient develops any respiratory distress or worsening of surgical emphysema, the drain clamp must be released and urgent medical advice sought.
3. Drains for pleural effusions however can be clamped or closed. This will allow controlled aspiration and drainage of pleural fluid to prevent complications of rapid drainage.

When changing the drainage bottle, a drain can be clamped or closed (for effusions only) to prevent air from coming into and up the tube. Remember that the following drainage bottle (if it is an underwater seal) will need priming to prevent air entering back up into the tube and pleural cavity.

#### Suction

1. Suction is usually not needed if a person is able to adequately cough, as this will generate higher pleural pressure than suction will.

2. However, if a patient is unable to do this, and reinflation is poor, low pressure high flow suction can be applied (1-2kPa or 10-20 cmH<sub>2</sub>O).
3. The suction must be applied through high volume, low pressure equipment that can be obtained from the respiratory wards
4. When suction is not being used or is not working properly it **must** be removed to prevent a closed system and iatrogenic tension developing.

Patients should be encouraged to mobilise with chest drains in situ to prevent hospital acquired medical conditions associated with poor mobility. Appropriate thrombo-prophylaxis may be required according to the circumstances.

Patients should have access to good and appropriate analgesia throughout the duration the drain remains in situ. Patients should be able to breathe in and cough without pain.

Dressings on chest drains should be checked daily and changed appropriately. The drain site should be monitored for signs of infection, drain position and length of tube outside the patient and surgical emphysema.

When patients are transferred from one clinical area to another, clear handover about the drain should occur between teams (both nursing and medical). This should involve the following points:

1. The indication for the drain insertion and any associated medical issues relating to this
2. Date of insertion, and any complications of insertion
3. The latest chest drain observations including whether the drain is clamped/closed
4. The immediate management plan and any specific advice given to this patient.
5. The handover should occur between qualified and trained professionals only.

### **Drain removal**

Chest drain should be removed as per the plan from the respiratory physician, and will be dependent upon the original pathology. Chest drains inserted for pleural effusion can be removed once the effusion has reduced to less than 200ml a day for two days, and when not considering the patient for sterile talc pleurodesis. Chest drains inserted for pneumothorax will often be removed when there is radiological, clinical resolution of the pneumothorax without complications (such as trauma or bronchial-pleural leak) and the patient is asymptomatic.

When removing the chest drain, ensure aseptic technique is followed at all times, and the whole drainage kit is disposed of correctly. This is usually by double bagging a clinical waste bag, and placing the used equipment wholly into this and following the Trust protocol of disposing clinical waste. Ensure all sharps are disposed of in a sharps bin as per Trust policy.

To remove, ensure the patient is comfortable and has had appropriate analgesia. After cutting the suture holding the drain in situ, ask the patient to breathe out deeply and hold their breath (Valsalva manoeuvre) and remove the drain quickly. When it has been removed, hold some gauze over the drain site to prevent any oozing or bleeding. Ensure that the drain hole is small enough to cover with a waterproof dressing or place a suture and tie it over the opening if the

drain hole is large and does not come together well (usually done with an 18 French drain or larger). Document in the notes the removal procedure and any instructions regarding future management including removal of any sutures which is normally at 10 days.

Following removal, a repeat chest radiograph should be performed and reviewed to check that the original pathology has resolved.

## APPENDIX 2 – EQUALITY IMPACT ASSESSMENT - PART 1 INITIAL SCREENING

Service/Function/Policy/Project/ Strategy	Care Group/Executive Directorate and Department	Assessor (s)	New or Existing Service or Policy?	Date of Assessment
Chest Drains – Guidelines for the Insertion and Management in Adults	Emergency Care Group	Daniel Trushell-Pottinger Dawn Murray	Existing	26 July 2021
<b>1) Who is responsible for this policy?</b> Name of Care Group/Directorate: Emergency Care Group				
<b>2) Describe the purpose of the service / function / policy / project/ strategy?</b> Who is it intended to benefit? What are the intended outcomes? To provide Trust staff undertaking examination, treatment or providing care with guidance on the use of chest drains. This will safeguard the patient and practitioners				
<b>3) Are there any associated objectives?</b> Legislation, targets national expectation, standards Compliance with British Thoracic Society standards of care and National Patient Safety Agency Rapid Response Report				
<b>4) What factors contribute or detract from achieving intended outcomes?</b> None				
<b>5) Does the policy have an impact in terms of age, race, disability, gender, gender reassignment, sexual orientation, marriage/civil partnership, maternity/pregnancy and religion/belief?</b> No				
<ul style="list-style-type: none"> <li>• If yes, please describe current or planned activities to address the impact [e.g. Monitoring, consultation]</li> </ul>				
<b>6) Is there any scope for new measures which would promote equality?</b> [any actions to be taken - No				
<b>7) Are any of the following groups adversely affected by the policy?</b>				
<b>Protected Characteristics</b>	<b>Affected?</b>	<b>Impact</b>		
a) Age	No			
b) Disability	No			
c) Gender	No			
d) Gender Reassignment	No			
e) Marriage/Civil Partnership	No			
f) Maternity/Pregnancy	No			
g) Race	No			
h) Religion/Belief	No			
i) Sexual Orientation	No			
<b>8) Provide the Equality Rating of the service / function /policy / project / strategy – tick (✓) outcome box</b>				
Outcome 1 ✓	Outcome 2	Outcome 3	Outcome 4	
<b>Date for next review:</b> August 2024				
<b>Checked by:</b> Dr Daniel Trushell-Pottinger			<b>Date:</b> July 2021	

**SIGN IN (To be read out loud)**

**SIGN OUT (To be read out loud)**

**Before giving sedation or starting procedure**



**Before any member of the team leaves the procedure room**

- Have all team members been introduced by name and role?  
 Yes
- Has the patient confirmed his/her identity, site, procedure and consent?  
 Yes
- Does the patient have a known allergy?  
 Yes     No

**Operator:**

- Has the operator confirmed the site, procedure and consent form?  
 Yes
- Has the procedure site been marked as indicated on the consent form?  
 Yes     Not applicable
- Has essential imaging been reviewed?  
 Yes     Ultrasound guidance used     Not applicable
- Is essential imaging displayed?  
 Yes     Not applicable
- Is the required equipment available?  
 Yes
- Are there increased risks of ventilatory failure, airway difficulties or aspiration?  
 No     Yes, and appropriate action taken
- Have risk factors for bleeding and renal failure been considered?  
 Yes
- Are there any critical or unexpected steps you want the team to know about?  
No     Yes

**Registered Practitioner:**

- Is monitoring equipment and medication (including sedation reversal agent) check complete?  
 Yes     Not applicable
- Has the sterility of the equipment been confirmed (by date or other method)?  
 Yes
- Are there any equipment issues or concerns?  
 No     Yes
- Has antibiotic prophylaxis been given?  
 Yes     Not applicable

**Registered Practitioner verbally confirms with the team (tick to indicate YES):**

- Has the name and site of the procedure been recorded?
- Have all needles, guidewires and catheters used been accounted for and documented on procedural record? (or not applicable)
- Have the specimens been labelled including patient name (or not applicable)?
- Have any equipment problems been identified that need to be addressed?  
 Yes     No
- Have the instructions for post procedural care for this patient been agreed?
- Have VTE prophylaxis instructions been documented?
- Have all controlled drugs been accounted for?

**PATIENT DETAILS**

**Procedure:**  
**Date:**

**PATIENT ID LABEL**

**Registered practitioner confirms that the list has been read out.**

**Name:**  
**Signature of Registered Practitioner**

**Registered practitioner confirms that the list has been read out.**

**Name:**  
**Signature of Registered Practitioner**