

## Pleural Procedures Guideline for Adult Patients:

- Chest Drain Insertion
- Pleural Aspiration for Pleural Fluid

Subject:	Pleural procedures: chest drain insertion, pleural aspiration for pleural fluid (adult patients)
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Key Words:	Pleural, chest drain, seldinger, aspiration, pleural effusion, pneumothorax

## Version Control Sheet

Version	Date	Author	Status	Comment
1.0	Feb 2015	Dr Rizwan Kaiser (Consultant)		This new guideline combines the content of two pre-existing guidelines into one singular document for pleural procedures for adult patients.

### Abbreviations contained within this document:

BTS	Brithsh Thoracic Society
CXR	Chest X Ray
US	Ultrasound Scan
CT	Computed Tomography
ED	Emergency Department
ITU	Intensive Care Unit
LDH	Lactate Dehydrogenase
FBC	Full Blood Count
LFT	Liver function tests
CRP	C Reactive Protein
MCS	Microscopy, Culture, and Sensitivity
AFB	Acid Fast Bacilli
MDT	Multidisciplinary Team

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## 1. Introduction

In 2008 the National Patient Safety Agency (NPSA) issued an alert<sup>1</sup> highlighting the risks associated with insertion of seldinger chest drains. The guidance followed reports of 12 deaths and 15 incidents of severe harm following chest drain insertions over 3 years from Jan 2005 to Mar 2008, with several other less severe cases likely to have gone unreported. The report made recommendations for safer practice. These guidelines contain recommendations from this report and the updated BTS guidelines on Pleural disease<sup>2</sup>, and give guidance for best practice. The guideline is concerned with the safe and appropriate management of chest drains for pleural effusions and pneumothorax, and pleural aspiration for pleural effusions.

## 2. Criteria for use (guideline scope)

This guideline is for all medical personnel involved in the insertion and management of chest drains and pleural aspiration. It will outline the standards for assessment of the patient, where the procedure should take place, the training required and the procedure itself.

This guideline should be read in conjunction with Trust guideline on the 'management of a unilateral pleural effusion', and 'management of spontaneous pneumothorax'.

### **Before considering doing any pleural procedure, the clinician should ask :**

- Do I need to do this ?
- Does it need to be done as an emergency – can it wait ?
- Have I had enough training to feel competent to do this? Are senior staff to hand?
- Am I familiar with this equipment ?
- Is ultrasound available, with trained staff, to perform aspiration or drain safely for pleural effusions ?

## 3. Training and competencies to insert chest drain

Chest drains should only be inserted by doctors who are fully trained in the procedure. Documentation of level of competency in relation to chest drain insertion should be included in all trainees training portfolios.

Chest drain insertion is a core competency expected of doctors doing accident & emergency, anaesthesia, intensive care, medicine, respiratory and surgical training.

There is a hierarchy of chest drain competencies: [see Appendix 1](#)

## 4.0 Chest drain insertion

### 4.1 Indications

- Pneumothorax
  - in any ventilated patient
  - tension pneumothorax after initial needle relief
  - persistent or recurrent pneumothorax after simple aspiration
  - Large spontaneous pneumothorax in patients greater than 50 years of age
- Symptomatic malignant pleural effusions
- Empyema and complicated parapneumonic pleural effusion
- Traumatic haemopneumothorax

### 4.2 Timing of Procedure

Pleural procedures should not take place out of hours, except in an emergency (significant cardiac/respiratory compromise). See algorithms for insertion of a chest drain ([Appendix 2](#)), management of a unilateral pleural effusion ([Appendix 3](#)), and management of a spontaneous pneumothorax ([Appendix 4](#))

Chest drains should not be inserted for a pleural effusion out of hours unless there is clear evidence that the patient's condition is compromised by the effusion. For example significant hypoxia not ameliorated by modest oxygen therapy, or significant haemodynamic compromise due to a large effusion. Out of hours, with a large pleural effusion, it is safer to perform therapeutic aspiration (see later section) to relieve symptoms until working hours when appropriate expertise is available. Chest drains should only be inserted by competent and qualified operators.

### 4.3 Pre Procedure Preparation

**Asceptic Technique** – The doctor carrying out procedure should wear sterile gown and gloves, and sterile field established using sterile drapes.

**Prophylactic antibiotics** are not indicated for chest drain insertions for pneumothorax or pleural effusion, unless in case of penetrating chest trauma.

**Clotting disorders** – Non urgent pleural aspiration and chest drain should be avoided in anticoagulated patients until INR <1.5 and Platelet count >50.

**Consent** - Written consent should be obtained for chest drain insertion, unless in emergency situations. Chest drain specific consent form should be completed ([Appendix 6](#)). The commonest complications are pain, intrapleural infection, wound infection, drain dislodgement, drain blockage, and visceral

injury, which is the most serious complication. All of these possible sequelae should be detailed in the consent process. All patients should have a Chest Drain Insertion Safety Checklist completed ([Appendix 5](#)).

#### **4.5 Imaging Guidance**

All patients must have a recent Chest X Ray available.

Thoracic ultrasound guidance is NOT required when aspirating or inserting chest drain for pneumothorax.

Ultrasound guidance is required for all pleural procedures for pleural fluid. Ultrasound should be performed by a trained operator who should have achieved level 1 competency in thoracic ultrasound.

Ultrasound guided pleural intervention for pleural fluid has been shown to reduce the failure rate and risk of complications, particularly pneumothorax and inadvertent organ puncture. However, it should be noted that ultrasound may not reduce the incidence of laceration of intercostal vessels because they are not visualised on ultrasound.

If CXR shows unilateral 'whiteout' (complete opacification of hemithorax), checking tracheal position may help distinguish effusion from lung collapse, but be aware that the two may coexist. Therefore, Imaging (US or CT) is strongly recommended before proceeding.

Even in the presence of an obvious large effusion on CXR, US guidance may reveal underlying abnormalities that are not apparent on CXR such as cardiac enlargement or displacement, raised hemidiaphragm or adherent lung.

Ultrasound marking of a site ('X marks the site') for subsequent remote aspiration or chest drain insertion is no longer considered acceptable.

Do not confuse a large bulla with a pneumothorax : old CXRs on PACS archive may help. If in doubt, discuss with a radiologist and obtain a chest CT prior to drain insertion if appropriate.

#### **4.6 Size of Drain**

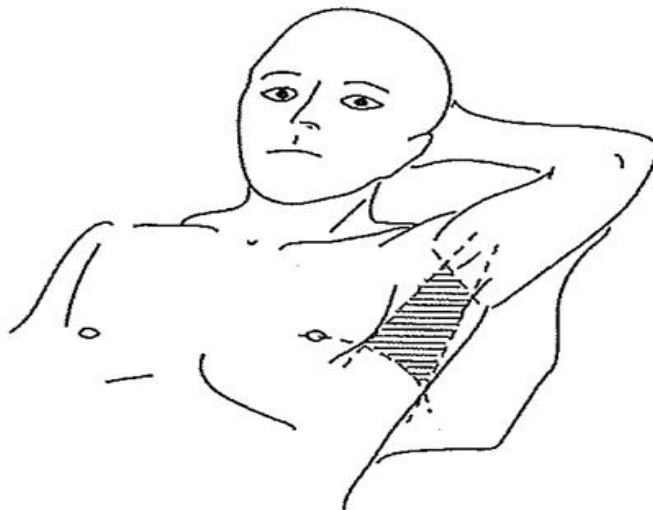
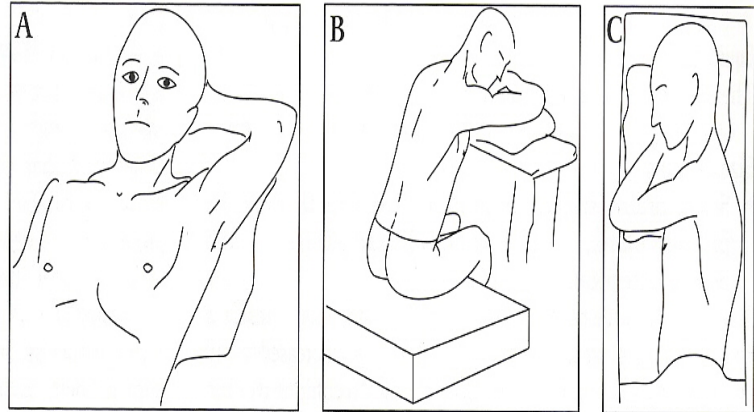
Small bore seldinger drains (Rocket 12F size available in ED, ITU, Nightingale Ward) should be used as first line therapy for pneumothorax, and free flowing pleural effusions.

Larger bore drains inserted by blunt dissection should only be considered (only after senior specialist review) in certain settings such as cardiothoracic surgery, trauma, haemothorax, viscous empyema, or pneumothorax with persistent high volume air leak.

## 4.7 Patient Position and Site of Insertion

The preferred position for standard drain insertion (A) is on the bed, slightly rotated, with the arm on the side of the pathology behind the head. Alternative positions are shown below, lateral decubitus position (C) may be appropriate for more frail patients.

**Figure 3** Common patient positions for chest drain insertion. (A) Semi-reclined with hand behind head. (B) Sitting up leaning over a table with padding. (C) Lateral decubitus position.



The preferred site for pleural aspiration and chest drain is the **'triangle of safety'**, formed *anteriorly* by the lateral border of the pectoralis major, *laterally* by the lateral border of the latissimus dorsi, inferiorly by the line of the 5th intercostal space and *superiorly* by the base of the axilla (as shown in the figure). This position minimises the risk to blood vessels, muscle and breast tissue.

The insertion site can be varied if ultrasound imaging identifies a more appropriate site for a loculated pleural effusion.

## 4.8 Analgesia and Sedation

Premedication can be considered, especially in anxious/agitated patients.

- 1-5 mg IV Midazolam titrated to effect, or an opioid analgesic (e.g. 2.5 mg IV morphine given immediately before procedure or Morphine Sulphate solution 10 mg 1 hour prior to procedure).

Beware of respiratory depression, so monitor oxygen saturations continuously with pulse oximetry. Reversible agents should be immediately accessible if needed (flumazenil, naloxone).

#### 4.9 Equipment required

- Sterile gloves, gown, and drapes
- Skin antiseptic solution (chlorhexidine solution or chloroprep brush x2)
- Gauze swabs
- Selection of needles and syringes (2 green and 1 orange needle, 20 ml syringe)
- Local Anaesthetic (e.g. 10-20 ml 1% lignocaine)
- Scalpel and blade
- Non absorbable Suture e.g. 1-0 silk
- Seldinger chest drain kit (12F size currently available in ED, ITU, Nightingale )
- Connector tubing
- Closed drainage system (incl sterile water for underwater bottle - fill bottle with water to marked level)
- Transparent dressing (tegaderm)

**N.B.** Complete ward procedure pack available on Nightingale Ward. Only additional items required to this will be 1% lignocaine, sterile gloves, cleaning solution, connector tubing and underwater bottle

#### 4.9 Insertion technique

Immediately before drain insertion, the site and side of insertion should be confirmed by reviewing the CXR and clinical signs.

Enter pleural space at upper border of rib, so as to avoid trauma to neurovascular bundle.

Using a small gauge needle (eg orange or blue) infiltrate the skin with anaesthetic by raising a dermal bleb. Then infiltrate the intercostal muscles and pleura with a green (21G) needle.

Local anaesthetic - Maximum dose of lignocaine is 3 mg/kg, which corresponds to about 20 ml 1% lignocaine or 10 ml 2% lignocaine in 70 kg.



An attempt to aspirate the pleural contents (air if pneumothorax or fluid if effusion) should be made with a green needle whilst anaesthetising. **If not able to aspirate pleural contents, do not proceed with drain insertion,** and seek specialist help (respiratory team or interventional radiologist).

The pleural space is located using the introducer needle and syringe (in the chest drain kit). The depth of needle when it enters the pleural space is noted.

Once pleural space located, remove syringe and pass guidewire gently down hub of needle, directed upwards (if pneumothorax) or base of pleural cavity (for fluid).



Remove needle, ensuring that guidewire remains in pleural space. A small skin incision is then made with scalpel at insertion site.

Pass dilator gently over the guidewire using a gentle twisting action. Dilator needs to be passed only 1cm beyond the depth to the pleura as measured with the introducer needle. Mark depth with a safety guard on dilator to avoid excessive dilation risking lung injury.

Tract is further widened by using a series of enlarging dilators upto the size of the drain.

Pass drain over guidewire, aiming upwards towards apex (for pneumothorax), and basally (for effusion). The entire drain does not need inserting to the hilt, the depth should be enough to ensure the last drainage hole is well within the pleural space (usually 8-12 cm, depending on thickness of chest wall).

The guidewire is then removed leaving the drain in place.

Connect drain to underwater seal bottle using connector and 3 way tap, which is provided in drain kit. The bottle should have been filled with sterile water to marked level.

#### 4.10 Securing the drain

Suture the drain firmly to skin to stop drain falling out, using 1 or 2 holding sutures (use non absorbable 1-0 silk). Purse string suture is not necessary.

Drain fixator devices (available in drain pack) which fix to the skin and then attach to the drain can also be used.

Apply transparent dressing (e.g. tegaderm) as this allows wound site to be inspected by nursing staff for leakage or infection.

An omental tag of tape allows tube to lie a little away from chest and prevents kinking at insertion site.

#### 4.11 Drain malposition

If a drain fails despite apparent acceptable position on CXR, CT scan may demonstrate drain malposition to be intraparenchymal or extrapleural.



A chest drain may be withdrawn to correct a malposition but should **NEVER** be pushed in due to risk of introducing infection.

A further drain should never be inserted through the same hole as previous dislodged drain as this can introduce infection.

#### 4.12 After chest drain insertion

Request a Chest X-Ray and review the drain position yourself.

All patients undergoing chest drain must have a chest drain insertion checklist proforma completed and filed in medical notes.

Check for complications and document procedure in medical notes.

Provide patient information leaflet to patient if not already done so.

Underwater seal draining bottle must stay below chest drain insertion level.

Chest drains should be managed on wards familiar with chest drains and their management (for medical inpatients ideally only on Nightingale and Mary Seale Wards)

Swinging fluid level with respiration indicates drain is patent and in the pleural space.

A chest drain chart should be started and recorded regularly.

Drains should be checked daily for wound infection, fluid drainage volumes, and documentation for swinging and/or bubbling.

#### 4.13 Rate of fluid drainage, Clamping of tube, and Suction



As a general rule do not clamp chest drain in a pneumothorax. **A bubbling chest drain should never be clamped**, as may lead to potential fatal complication of tension pneumothorax.

Drainage of a large pleural effusion should be controlled to prevent the potential complication of re-expansion pulmonary oedema.

A maximum of 1 L should be drained in the first hour after insertion of the drain. Thereafter clamp for 2 hours, then rest of the fluid can be drained off slowly (rate of 500 ml/hour).

Negative pressure suction (only on the advice of the respiratory team) may be attempted in the treatment of a non resolving pneumothorax. Use a high-volume low pressure system at level 10-20 cm H<sub>2</sub>O

#### 4.14 Removal of chest drain

The chest drain can be removed once the fluid drainage has decreased to less than 100-200 ml/day, or the drain is no longer functioning.

In the case of a pneumothorax, drain should be removed once bubbling has ceased and CXR demonstrates lung re-inflation.

The drain can be removed in expiration with a valsalva manoeuvre. The wound should be immediately covered with an air tight dressing, a suture is not usually required to close the wound for small bore tubes unless incision is large.

## 5.0 Pleural aspiration for pleural fluid (Thoracentesis)

Pleural Aspiration describes a procedure whereby pleural fluid may be aspirated via a system inserted temporarily into the pleural space. This may be for diagnostic purposes (usually removing 20-50 ml fluid) or therapeutic (up to 1.5L) to relieve symptoms.

### 5.1 Indications

Malignant (known or suspected) pleural effusions

- small volume aspiration for diagnosis
- larger volume aspiration to relieve symptoms

Pleural effusion associated with sepsis (suspected empyema)

- Diagnostic for decision to insert drain (needs drain if pH<7.2 or frank pus)

### 5.2 Pre Procedure Preparation and Consent

#### Timing of Procedure:

Most pleural aspirations do not need to be performed as an emergency out of hours and should not be carried out overnight, except in the case of significant respiratory or cardiovascular compromise (see above).

#### Clotting disorders:

Non urgent pleural aspiration should be avoided in anticoagulated patients until INR >1.5 and Platelet count >50.

#### Consent:

Operators should ensure documented consent is obtained (verbal or written) and that they are either competent or being supervised to do the pleural aspiration. The commonest potential complications from pleural aspiration are pneumothorax, procedure failure, pain, haemorrhage, and visceral injury.

#### Asceptic Technique:

Pleural aspiration should be performed in a clean area and using full asceptic technique. Empyema risk increases with the number of aspiration attempts.

### 5.3 Image Guidance

A recent CXR should be available prior to performing a pleural aspiration.

Ultrasound guidance is required for all pleural procedures for pleural fluid, to reduce potential failure rate and risk of complications.

Ultrasound guidance is useful in the presence of unilateral opacification of hemithorax on CXR ('whiteout'), as this appearance may also be due to lung collapse.

Even in the presence of a large effusion, ultrasound guidance may reveal underlying abnormalities that are not apparent on CXR such as cardiac enlargement or displacement, a raised diaphragm or adherent lung.

Ultrasound marking of a site ('x marks the site') for subsequent remote aspiration or chest drain insertion is no longer considered acceptable.

#### **5.4 Patient position and site of insertion**

The patient may sit upright leaning forward with arms elevated but resting on a table or bed as described in chest drain section earlier (page 7).

The preferred site for insertion of the needle for pleural aspiration is the triangle of safety as shown earlier (page 6). This site may be varied and be more posterior if ultrasound identifies a more appropriate site for a loculated pleural effusion. However it should be noted that posteriorly the neurovascular bundle may not be protected by the lower flange of the rib, and therefore a more lateral or anterior approach is considered safer.

#### **5.5 Technique of pleural aspiration**

For simple diagnostic pleural aspiration, a 21G green needle and a 50 ml luer lock syringe is sufficient to obtain a sample.

If aspiration of a larger sample of fluid is required (therapeutic tap), there are 2 options. Either use an orange or grey cannula (14 G) connected to a 3 way tap, 50 ml syringe and tubing, OR pleural aspiration kit with 2 L bag (this kit is available on Nightingale ward or Ambulatory Clinic, and should only be used by competent operators familiar with the kit).

Skin cleansing and an aseptic technique should be used.

Local anaesthesia is not usually required for a simple procedure but should be considered if difficulty attaining the pleural space is likely (e.g. with an inexperienced operator or if patient has a thick chest wall).

Using a small gauge needle (e.g. orange 25G or blue 23G) infiltrate the skin by raising a dermal bleb. Then infiltrate the intercostal muscles and pleura with a green (21G) needle.

The pleural space should be aspirated with the needle used to administer the lignocaine, and the depth of the pleural space can then be confirmed.

In the case of a diagnostic pleural aspiration, a syringe attached to a green needle is inserted into the pleural space, and 20-50 ml of fluid withdrawn and sent for investigation (Microbiology for culture, Cytology, Biochemistry for protein & LDH, and pH analysis if pleural infection suspected). Remember to send paired serum samples for protein & LDH

For larger effusions being aspirated to dryness, local anaesthetic should be administered, and a cannula or pleural aspiration kit should be used.

The aspiration needle or cannula should be advanced into the chest, aspirating continuously until the pleura is breached and fluid withdrawn, noting the depth of pleural space.

The cannula should then be attached to a 3 way tap and fluid withdrawn into the syringe and expelled via the free port of the 3 way tap. This may be into a bag or jug.

## 5.6 Volume of fluid to be removed

The procedure should be stopped when :

- No more fluid can be aspirated.
- Patient develops symptoms of cough or chest discomfort.
- 1.5 litres has been withdrawn.

## 5.7 Follow Up

A Chest X-Ray after a simple pleural aspiration is not required unless :

- Air is withdrawn
- Procedure is difficult
- Multiple attempts are required
- Patient becomes symptomatic

## Contacts

- Respiratory SpR (bleeps 3359/3049)
- Respiratory Consultants (via switchboard)
- Nightingale ward (Ext 5521, 4275, or 3117)

## 6.0 References

[1]. NPSA Rapid Response Report 2008 NPSA/2008/RRR003

[2]. Pleural Procedures and thoracic ultrasound : British Thoracic Society pleural disease guideline 2010. Havelock T, Teoh R, Laws D, Gleeson F, on behalf of the BTS Pleural Disease Guideline Group. Thorax 2010;65 (Suppl 2): ii61-ii76

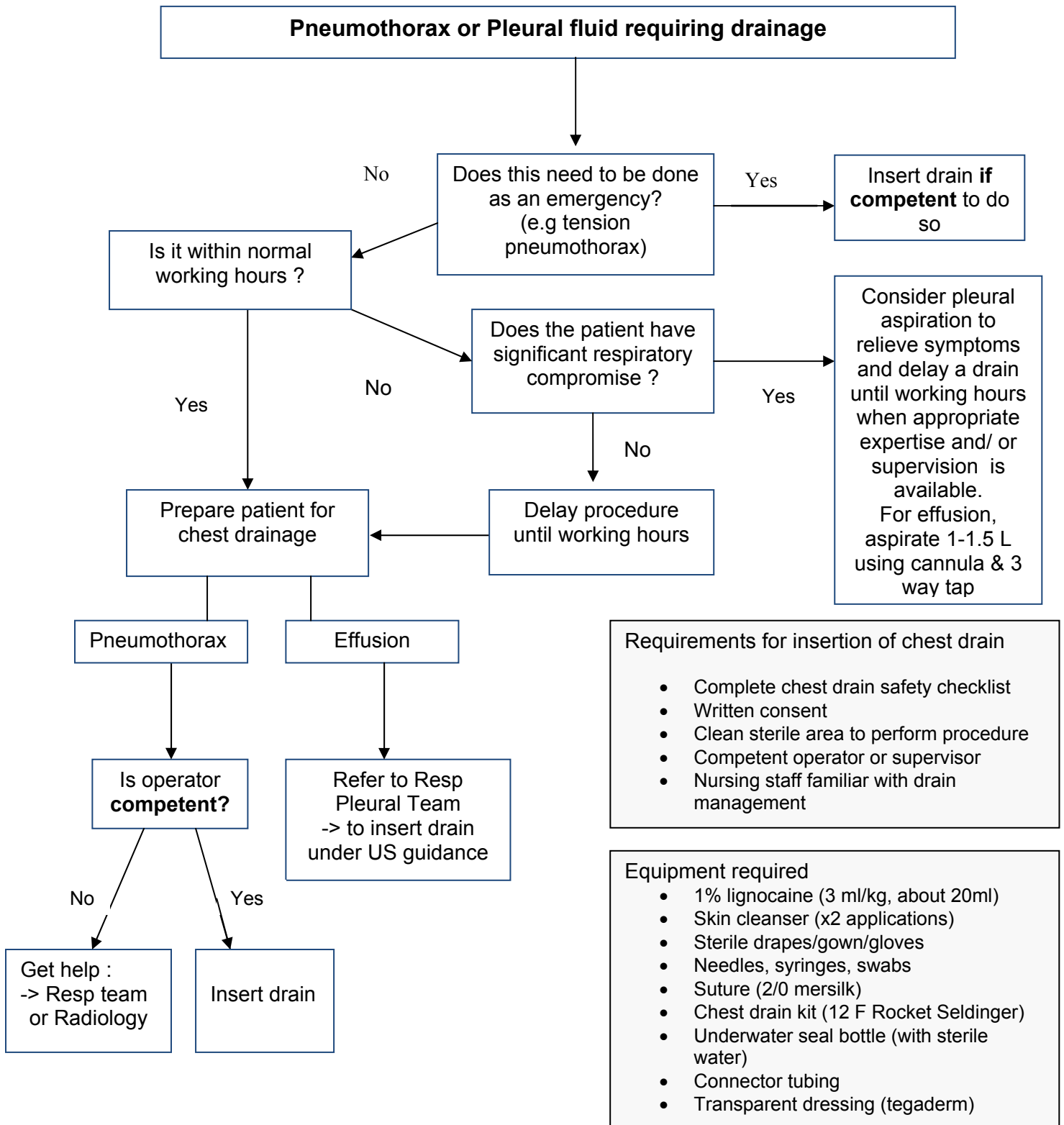
## Appendix 1

**Chest Drain insertion competencies**

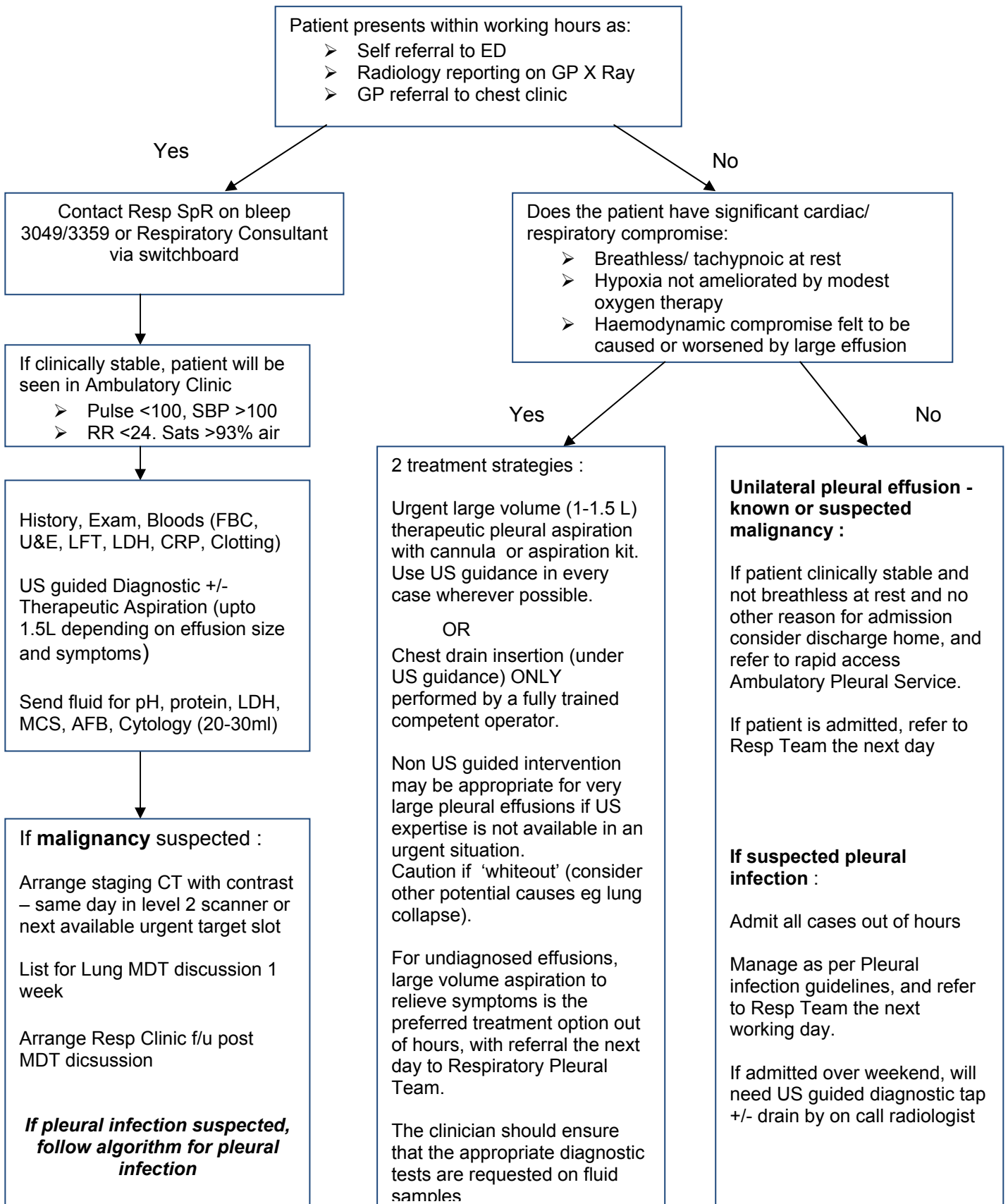
<b>Stage 1 competency</b>	CT1, CT2, or equivalent in – core accident and emergency, anaesthetic, intensive care, medical, radiology, respiratory, and surgical training	Can perform chest drain insertion with supervision by an operator (level 2 or greater) who has recent experience of chest drain insertion
<b>Stage 2 competency</b>	ST3 equivalent or above – accident and emergency, anaesthetic, intensive care, medical, radiology, respiratory, and surgical trainees	It is expected that doctors within this grade will have undertaken a number of chest drain insertions and have been directly supervised undertaking the procedure on at least 2 occasions in each year. Following such assessment they may carry out the procedure independently.
<b>Stage 3 competency</b>	Any senior medical personnel experienced at performing these procedures, preferably with experience in ultrasound assisted drain insertion	These doctors are experienced and independent operators and may undertake the observation and assessment of other operators carrying out the procedure.

**Algorithm for the insertion of chest drain  
(Adapted from BTS guidelines<sup>2</sup>)**

➤ *To be read in conjunction with algorithm for management of unilateral pleural effusion and management of pneumothorax (Appendices 3 and 4)*



**Management Pathway for undiagnosed Unilateral Pleural Effusion**



**Respiratory Team Contacts:**

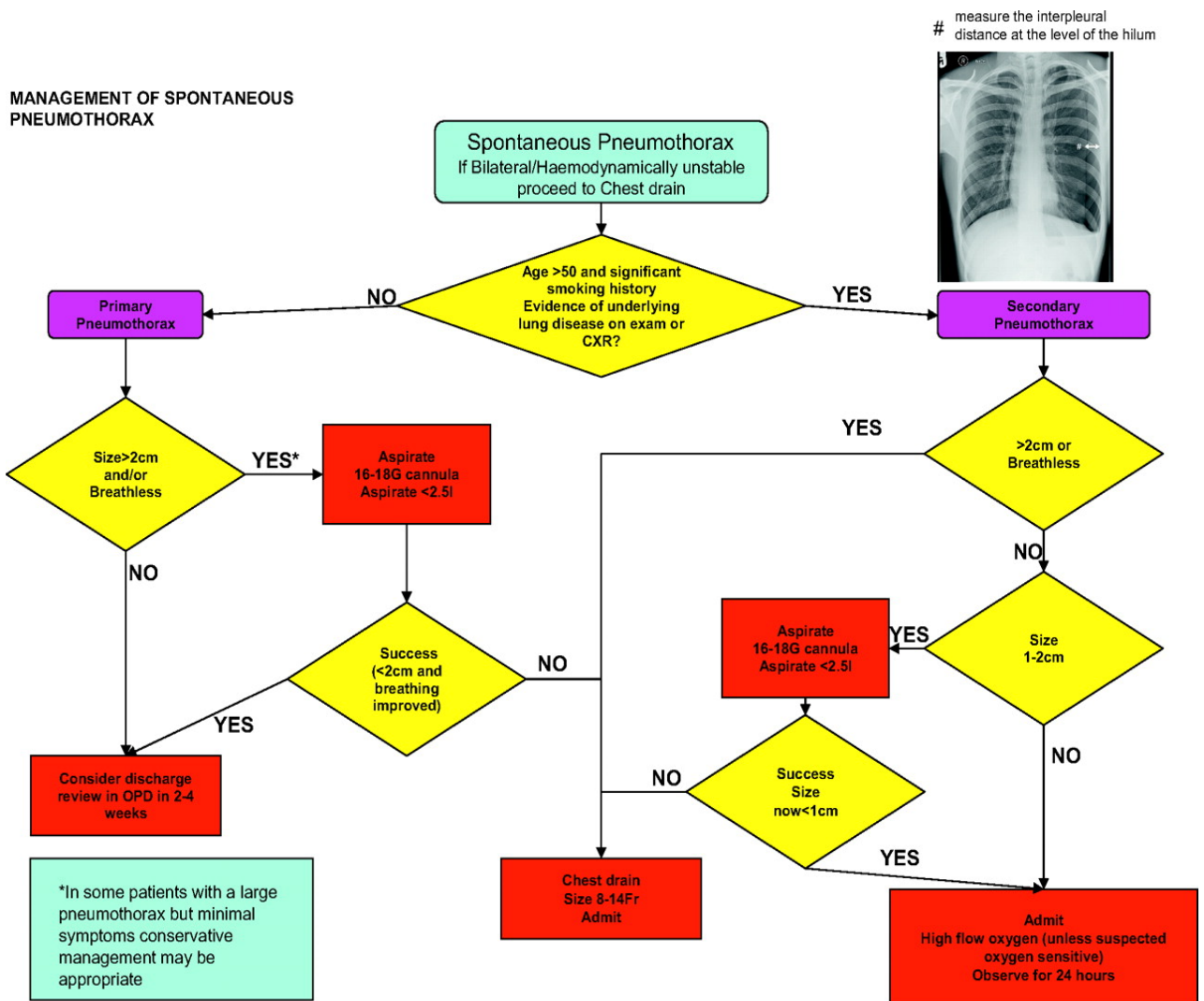
- Respiratory SpRs – bleep 3049/3359
- Respiratory Consultants – via switch board



## Appendix 4

# Algorithm for the management of a Spontaneous Pneumothorax

( BTS Guidelines 2010)



Refer to trust guideline on Management of Spontaneous Pneumothorax for further details

### Indications for Chest drain in Spontaneous Pneumothorax

- Large (> 2 cm) symptomatic Primary Pneumothorax, after failed aspiration
- Large (>2 cm) Secondary Pneumothorax
- 1-2 cm Symptomatic Secondary Pneumothorax, after failed aspiration (If shallow pneumothorax, may need CT guided drain).
- Pneumothorax of any size in a ventilated patient

**ENSURE THAT YOU ARE COMPETENT TO INSERT A CHEST DRAIN**

# Chest Drain Safety Checklist and Report

(Please complete in all cases where chest drain is inserted and then file in notes)

Pt Name: Hospital No: DOB: Ward:	<b>Indication for drain :</b>  Pneumothorax/ Pleural effusion/Other _____
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## Check before you start

Does the procedure need to be done right now?

Are you competent to do procedure ?

Confirm Ultrasound guidance used (for fluid)   
 If no, give reason: \_\_\_\_\_

Confirm written consent obtained

Coagulation checked (INR>1.5, Plt >50)

Confirm side of abnormality clinically

Correlate clinical signs with CXR

Site of drain insertion localised (safety triangle)



'triangle of safety': bordered anteriorly by lateral edge of pectoralis major, laterally by lateral edge of latissimus dorsi, inferiorly by the line of fifth intercostal space, and superiorly by base of axilla

## Procedure and Report

Don sterile gown and gloves

Apply 2 applications of Chorprep/antiseptic

Cover area with sterile fenestrated drape

**STOP** if unable to aspirate any fluid (if effusion) or air (if pneumothorax) with green needle when infiltrating anaesthetic -> get help from Resp team or Radiologist

Side: Rt ( ) Lt ( )

Site: .....

Lignocaine 1%: ..... mls

Appearance of fluid: .....

Amount drained: .....mls

Chest drain type & size: .....

Complications: .....

Samples sent for :

- Biochemistry [ ]
- Cytology [ ]
- MCS and AFB [ ]

## Post Procedure

Check the sutures, tubing and connections are secure

Patient information leaflet provided

Informed patient not to tug on drain and not to elevate bottle above level

Prescribed adequate analgesia

Confirm that if effusion, no more than 1000 ml to be drained in 1st hour

Started 'chest drain chart'

Informed site manager (if out of hours) & requested transfer to N'Gale Ward

Requested post procedure CXR and reviewed

Name of Dr inserting drain :  
 .....  
 Grade .....

Supervised: Yes/No

Supervised by:  
 .....  
 Grade .....

Date :

## Appendix 6

**Consent Form****Insertion of a chest drain**

Patient details ( or pre-printed label)	
Hospital number .....	
Patient surname/family name .....	
Patients first name .....	
Date of birth .....	
Special requirements .....	
<i>(eg other language/other communication method)</i>	

**Statement of Health Professional :**

I have explained the procedure to the patient. In particular I have explained :

The intended benefits :

- Drainage of air/ fluid from pleural space by insertion of a chest drain.

Serious or frequently occurring risks:

- Some pain & discomfort at insertion post procedure
- Bleeding
- Infection
- Adverse reaction to sedative drugs
- Organ injury

I have also discussed what the procedure is likely to involve, the benefits and risks of any available alternative treatments (including no treatment) and any particular concerns of this patients.

The following information leaflet has been provided :

Patient information leaflet on chest drain insertion

This procedure will involve :

Local anaesthesia  sedation

Health professionals signature..... Date: .....

Name (PRINT): .....Job Title: .....

Patient name: .....Hospital number: .....

**Statement of Interpreter (where appropriate)**

I have interpreted the information above to the patient to the best of my ability and in a way in which I believe he/she can understand.

Signed ..... Date .....

Name (PRINT) .....

**Statement of patient**

Please read this form carefully. If you have further questions, do ask – we are here to help you. You have the right to change your mind at any time, including after you have signed this form.

**I agree** to the procedure or course of treatment described on this form.

**I understand** that you cannot give me a guarantee that a particular person will perform this procedure. The person will, however, have appropriate experience.

**I understand** that I will have the opportunity to discuss the details of anaesthesia with an anaesthetist before the procedure, unless the urgency of my situation prevents this. (This only applies to patients having general or regional anaesthesia).

**I understand** that any procedure in addition to those described on this form will only be carried out if necessary to save my life or to prevent serious harm to my health.

**I confirm** that the risks, benefits, and alternatives of this procedure have been discussed with me and I have read and understood the above and agree to the procedure (or course of treatment) on this form.

Patients signature .....

Name (PRINT) .....

Date .....

**A witness should sign below if the patient is unable to sign but has indicated his or her consent. Young people/children may also like a parent to sign here**

Witness signature ..... Date .....

Name (PRINT) .....

## Appendix 7

### Chest Drain Insertion – Information for Patients

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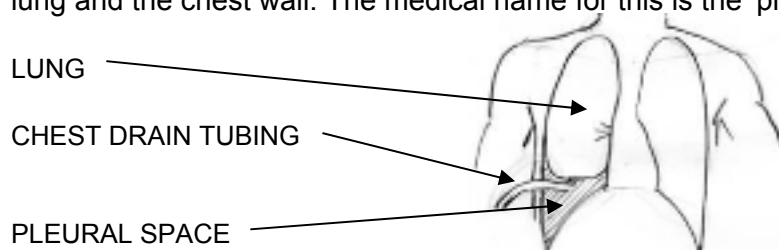
#### Introduction

This leaflet explains why we use chest drains and what you can expect if you are having one. It also answers the most frequently asked questions about chest drains. However, if you have any further questions, please do not hesitate to ask a member of your medical team.

Your doctor will explain why you need a drain and will also take your written consent to have the drain inserted.

#### What are chest drains for ?

A chest drain is a sterile plastic tube that allows us to drain the space between the lung and the chest wall. The medical name for this is the 'pleural space'.



#### What needs to be drained ?

We may need to drain :	Medical name
Air	pneumothorax
Fluid	pleural effusion
Blood	haemothorax
Infection and/or pus	empyema

#### What happens next if I need a drain?

The doctor will decide where to place the drain. This is usually the side of your chest just underneath the armpit. The doctor may use an ultrasound machine to show where best to place the drain. Ultrasound enables the doctor to 'look' through the chest wall. It is painless and non-invasive. A cool gel is used on the skin to ensure good contact for the ultrasound tip. You will have an injection of local anaesthetic to make the area where the drain will be inserted numb (anaesthetised). This can sometimes sting. You may also be given pain killers.

#### Will it hurt, what should I expect when the drain is inserted and how long will it take?

The anaesthetic injection and/or painkillers will prevent pain. However, if at any time during the procedure you do feel pain, please tell the doctor.

The doctor will explain how they would like you to sit, or lie, whilst the procedure takes place. The doctor will wear sterile gloves and a gown and your skin will be cleaned with an antiseptic to help reduce the risk of infection. You may be partly covered in a sterile sheet.

The drain will then be inserted between the ribs in the anaesthetised area and connected to a tube and drainage bottle containing water. The water acts as a one way seal to prevent air or fluid to drain out and not go back into your chest. The whole procedure usually takes about 20-30 minutes.

### **Who will put my drain in?**

Your drain will be put in on the ward by an appropriately qualified and experienced doctor. Sometimes a qualified trainee doctor will insert the drain, but they will always be supervised by a doctor who is already fully trained in the procedure.

### **How will the drain be attached?**

We use both a stitch, to tie the drain in, and adhesive dressing on the skin. However, please move carefully as drains can still be pulled out.

### **How long will the drain be in?**

It depends on why you need the drain. However, your medical team will keep you informed on a regular basis. You may need several X-rays during this time to check progress.

### **How will the drain be removed?**

This is straightforward and is usually done by a nurse. Once all the dressings are removed, the drain is pulled out gently. You may be asked to hold your breath in a special way when this is done. It can be uncomfortable but only lasts a few seconds.

### **Can anything go wrong?**

There is a small risk of infection and bleeding but every effort is made to prevent this from happening. Air can also sometimes leak into the pleural space during the procedure but this is not usually a problem and it will usually come out when the drain is in place.

### **Important things to know about your chest drain**

- You may see air bubbling out through the bottle. This is normal. Fluid may also drain from the chest. This is usually clear but sometimes may be blood stained. This is nothing to be alarmed about.
- There is no need for you to be in pain. If you are in pain ask for painkillers.
- The drain can come out if pulled or twisted so please take care. If the drain does come tell someone straight away.
- You need to keep the drainage bottle below the level of the drain (at the point it enters the chest). Usually it is placed on the floor.
- If you feel more breathless, please tell the nursing staff.
- Your drain may require flushing with sterile water to stop it from blocking. If this is needed it will be done by nursing staff and is not painful.

The drainage bottle contains water which acts as a seal to prevent air leaking back up the drain into the pleural space. It is essential therefore that the bottle is kept upright at all times with the tube below



Correct  
Bottle upright  
and the tube  
tip is under  
water



Not correct  
The bottle is  
tipped and the  
tube tip is not  
under water

### **What happens after the drain has been removed?**

You may have a stitch left in which is usually removed after 7 days. Some people have a little pain after the drain has been removed which may be helped by painkillers. If you have a lot of pain, difficulty breathing, or fever please tell a doctor nurse so they can look for a cause and treat it.

		Yes/No	Comments
1.	<b>Does the procedural document affect one group less or more favourably than another on the basis of:</b>		
	• Race	No	
	• Ethnic origins (including gypsies and travellers)	No	
	• Nationality	No	
	• Gender	No	
	• Culture	No	
	• Religion or belief	No	
	• Sexual orientation including lesbian, gay and bisexual people	No	
	• Age	No	
	• Disability - learning disabilities, physical disability, sensory impairment and mental health problems	No	
2.	<b>Is there any evidence that some groups are affected differently?</b>	No	
3.	<b>If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?</b>	No	
4.	<b>Is the impact of the procedural document likely to be negative?</b>	No	
5.	<b>If so can the impact be avoided?</b>	N/A	
6.	<b>What alternatives are there to achieving the procedural document without the impact?</b>	N/A	
7.	<b>Can we reduce the impact by taking different action?</b>	N/A	

### Checklist for the Review and Approval of Procedural Document

To be completed and attached to any procedural document when submitted to the relevant committee for consideration and approval.

	Title of document being reviewed:	Yes/No	Comments
1.	<b>Title</b>		
	Is the title clear and unambiguous?	Yes	
	Is it clear whether the document is a guideline, policy, protocol or standard?	Yes	
2.	<b>Rationale</b>		
	Are reasons for development of the document	Yes	

	<b>Title of document being reviewed:</b>	<b>Yes/No</b>	<b>Comments</b>
	stated?		
<b>3.</b>	<b>Development Process</b>		
	Is it clear that the relevant people/groups have been involved in the development of the document?	Yes	
	Are people involved in the development?	Yes	
	Is there evidence of consultation with stakeholders and users?	Yes	Respiratory, haematology, pathology, ambulatory care
<b>4.</b>	<b>Content</b>		
	Is the objective of the document clear?	Yes	
	Is the target population clear and unambiguous?	Yes	
	Are the intended outcomes described?	Yes	
<b>5.</b>	<b>Evidence Base</b>		
	Are key references cited in full?	N/A	
	Are supporting documents referenced?	N/A	
<b>6.</b>	<b>Approval</b>		
	Does the document identify which committee/group will approve it?	Yes	
<b>7.</b>	<b>Dissemination and Implementation</b>		
	Is there an outline/plan to identify how this will be done?	Yes	
<b>8.</b>	<b>Document Control</b>		
	Does the document identify where it will be held?	Yes	
<b>9.</b>	<b>Process to Monitor Compliance and Effectiveness</b>		
	Are there measurable standards or KPIs to support the monitoring of compliance with and effectiveness of the document?	Yes	
	Is there a plan to review or audit compliance with the document?	Yes	
<b>10.</b>	<b>Review Date</b>		
	Is the review date identified?	Yes	
	Is the frequency of review identified? If so is it acceptable?	Yes	
<b>11.</b>	<b>Overall Responsibility for the Document</b>		
	Is it clear who will be responsible for co-ordinating the dissemination, implementation	Yes	



	<b>Title of document being reviewed:</b>	<b>Yes/No</b>	<b>Comments</b>
	and review of the document?		

**Executive Sponsor Approval**

If you approve the document, please sign and date it and forward to the author. Procedural documents will not be forwarded for ratification without Executive Sponsor Approval

Name		Date	
Signature			

**Relevant Committee Approval**

The Director of Nursing and Patient Experience's signature below confirms that this procedural document was ratified by the appropriate Governance Committee.

Name		Date	
Signature			

**Responsible Committee Approval – only applies to reviewed procedural documents with minor changes**

The Committee Chair's signature below confirms that this procedural document was ratified by the responsible Committee

Name		Date	
Name of Committee		Name & role of Committee Chair	
Signature			

## Tool to Develop Monitoring Arrangements for Policies and guidelines

<b>What key element(s) need(s) monitoring as per local approved policy or guidance?</b>	<b>Who will lead on this aspect of monitoring? Name the lead and what is the role of the multidisciplinary team or others if any.</b>	<b>What tool will be used to monitor/check/observe/Assess/inspect/authenticate that everything is working according to this key element from the approved policy?</b>	<b>How often is the need to monitor each element? How often is the need to complete a report? How often is the need to share the report?</b>	<b>What committee will the completed report go to?</b>
<b>Element to be monitored</b>	<b>Lead</b>	<b>Tool</b>	<b>Frequency</b>	<b>Reporting arrangements</b>
<b>Use of ultrasound guidance with pleural interventions for effusion</b>  <b>Use of chest drain safety checklist and consent form at time of chest drain insertion</b>	<b>Respiratory Lead for Pleural disease</b>	<b>BTS Pleural Procedures Audit Tool</b>	<b>Annual</b>	<b>Respiratory Team and Audit Committee</b>