University Hospitals of Leicester

Pleural Procedures Policy (LocSSIP – Local Safety Standards for Interventional Procedures)

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Review date and Details of changes made during review:

March 2012 - This Policy has undergone a complete review and rewrite and now includes both pleural aspirations as well as chest drains.

April 2016 – This policy has undergone a complete review and no new changes have been made.

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April 2019 – Incorporates Action points from LRI meeting of 15/06/2019 on who inserts a chest drain in an emergency at the LRI – point 6.1.4 page 5.

5.5e – completion of Intercostal Chest Drain & Pleural aspiration checklist and report – Appendix 5 Appendix 6 – management of DOACs in patients undergoing pleural procedures

August 2019 – Page 14 point 3.3 & 3.4 – UHL anticoagulation bridging policy on when to stop and recommence anticogulation

August 2019 – Safety checklists page 23/24 – updated to recommence anticoagulation post procedure August 2019 – include role of nurses and nursing associates

This policy represents the UHL LocSSIP (Local Safety Standards for Interventional Procedures) for pleural procedures

January 2021 – Incorporation of NPSA Alert NatPSA/2020/008/NHSPS – Deterioration due to rapid offload of pleural effusion fluid from chest drains.

April 2024 – Updated in light of BTS 2023 Pleural diseases guidelines and Clinical statement on pleural procedures with new algorithms

April 2024 – incorporation of UHL pleural procedures patient information leaflets + option to undertake digital consent using Concentric platform

Key words for searching - Aspiration, Pleural aspiration, chest drain, LocSSIP

1 INTRODUCTION

- 1.1 This document sets out the University Hospitals of Leicester (UHL) NHS Trusts Policy and Procedures for pleural procedures. These include pleural aspiration (both diagnostic and therapeutic) and intercostal chest drain insertion.
- 1.2 Within a hospital setting pleural aspiration and chest drain insertion may be required in many different clinical settings and for various indications. Chest drains are used to remove air, blood, pus or fluid from the pleural cavity. Their insertion is a common procedure but insertion is not without risk. In May 2008 the National Patient Safety Agency (NSPA) published a Rapid Response Alert (NPSA/2008/RRR003) following reports of 12 deaths and 15 cases of serious harm relating to chest drain insertion between January 2005 and March 2008.
- 1.3 In December 2020, the NPSA published a Safety Alert on deterioration due to unmonitored and uncontrolled rapid offload of pleural effusion fluid from chest drains following 16 incidents of harm to patients between May 2017 and October 2020. Recommendations on controlled drainage, post-procedure management plans and good practice points have been incorporated into this policy.
- 1.4 Pleural aspiration is regarded as a safer but more common procedure. Despite this there have been reports of visceral injuries and a death associated with this procedure. Pleural aspirations therefore, has been included as part of this policy.
- 1.5 The Trust recognises the risk associated with pleural procedures and this document is designed to address many of the issues raised in the NSPA report.
- 1.6 This document represents the Trust's LocSSIP (local safety standard on interventional procedues) with respect to pleural procedures.

2 POLICY AIMS

- 2.1 The standards in this policy aim to rationalise the use of chest drains and standardise care with respect to pleural procedures throughout the Trust.
- 2.2 This policy outlines
 - a) the need for a pleural aspirations and / or chest drain
 - b) the training opportunities and the competencies required of doctors performing pleural procedures
 - c) the nursing care of a patients undergoing pleural procedures

3 POLICY SCOPE

- 3.1 This policy applies to all areas of the trust where pleural procedures take place with the exception of chest drain insertion taking place in theatre during a surgical procedure and in ED in an emergency situation if there is not a suitably qualified US operator and they need to act in the best interests of the patient.
- 3.2 The policy applies to adult patients only. For advice regarding chest drains and pleural aspiration in children please refer to the Children's Guidelines available on INsite
- 3.3 This policy applies to medical staff deemed competent in pleural aspiration and chest insertion or those in training, who are being supervised by a suitably qualified individual (see section 5.6)
- 3.4 This policy applies to Registered Nurses and Registered Nursing Associates who care for patients who have had a pleural aspiration or chest drain inserted.
- 3.5 The ongoing care of all patients undergoing pleural procedures must be carried out in line with this policy.

4 DEFINITIONS

4.1 Pleural aspiration, thoracocentesis and thoracentesis can all be used interchangeably Pleural Procedures Policy

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5 ROLES AND RESPONSIBILITIES

5.1 Executive Lead

The Medical Director is Executive Lead for this Policy and has appointed a Senior Lead Clinician to act on their behalf. The Senior Lead Clinician is responsible for:

- a) Providing an advisory, training and monitoring role on all aspects of Pleural Procedures
- b) Ensuring participation in the national British Thoracic Society audit.

5.2 Clinical Management Group (CMG) Lead Clinicians and Head of Nurses are responsible for:

- a) Ensuring this policy is disseminated and implemented within their CMG
- b) Identifying a CMG 'sub lead' to support the implementation, training and monitoring of this policy and guidelines
- c) Ensure staff have the opportunity to attend training as necessary in line with service need and as identified in their annual appraisal

5.3 Consultant in charge of the Patient:

- a) Has overall responsibility for the care of the patient
- b) Provide advice and support to their medical team if concerns or issues are raised regarding training needs or competence
- c) Ensure any incidences regarding pleural aspiration or chest drains are reported through Datix

5.4 Nursing Staff are responsible for:

Ensuring the care of patients requiring a pleural aspiration or chest drain is provided in line with this policy and its associated guidelines.

5.5 All staff undertaking the insertion of chest drains or providing care for patients with chest drains are responsible for:

- a) Ensuring they are compliant with the standards set out in this policy and associated guidelines
- b) Work within their own competence and act on any identified training needs
- c) Gain written consent from patients (except in the event of a life threatening emergency) in line with Trust's Policy for Consent to Examination or Treatment – Ref:A6/2002.
- d) To report all incidents involving chest drains (including near miss events) via the DATIX incident reporting system
- e) Completing the Intercostal Chest Drain and Pleural Aspiration safety checklist and report (Appendix 5 & 6) and placing in the medical notes.

5.6 Education and Training

- a) Within UHL chest drains will be inserted and removed by medical staff only. Registered Nurses and Registered Nursing Associates trained in chest drain management may remove drains under guidance by the appropriate medical staff.
- b) Before insertion of a chest drain all operators¹ should be adequately trained.

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¹Operator is used as a term for all grades of medical staff undertaking chest drain insertion

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- c) In order to insert chest drains independently, junior operators must have completed a recognised practical course on chest drain insertion and have passed the associated assessment.
- d) As per the updated British Thoracic Society (BTS) pleural guidelines in 2023, the use of thoracic ultrasound is mandatory in all cases where fluid is drained. An ultrasound competent practitioner must be involved in the procedure (although does not necessarily have to conduct the procedure), except in Pneumothoraces.
- e) All trainees inserting chest drains independently should be in possession of a satisfactory Directly Observed Procedural Skills (DOPS) form.
- f) As a matter of good practice, operators must record chest drain procedures in their log book. Individual departments are recommended to keep records of operators deemed competent to insert chest drains independently. The arrangements for this will be made locally by the relevant chest drain sub-lead.

Support for training for Registered Nurses and Registered Nursing Associates in the care of chest drains is available from the Pleural Nurse Specialists (Sarah Johnstone - sarah.johnstone@uhl-tr.nhs.uk or Faye Hinchcliffe - faye.hinchcliffe@uhl-tr.nhs.uk) or the Glenfield Ward 29 Ward Manager/Matron on extension 13336

6 POLICY STATEMENTS AND PROCEDURES

6.1 Indications for and Timing of Pleural Procedures

- 6.1.1 Pleural procedures rarely need to be performed as an emergency and should be undertaken within hours. The exceptions are the insertion of a chest drain for:
 - a) Tension pneumothorax
 - b) A pneumothorax in a ventilated patient
 - c) Traumatic haemopneumothorax (contact trauma team/thoracic surgery)

If a patient requires symptomatic relief for a large pleural effusion, a therapeutic pleural aspiration (removing up to 1.5L of fluid) using thoracic ultrasound guidance can be performed, and the patient referred to respiratory medicine the following morning.

- 6.1.2 Other indications for chest drain insertion include:
 - a) Malignant pleural effusions
 - b) Empyema (these patients should be transferred to GH urgently for management by the respiratory team)
 - c) Complicated parapneumonic effusions
 - d) Pneumothorax which is persistent or recurrent after simple aspiration
 - e) Large secondary spontaneous pneumothorax in patients older than 50yrs
- 6.1.3 For patients who require a chest drain for these non-urgent conditions, the respiratory registrar on call should be contacted (CDU SpR on bleep 2903 (24/7), Respiratory ward referrals registrar (Monday-Friday 9am-5pm) on 07971 626323), who will arrange for transfer of the patient if appropriate.
- 6.1.4 **Urgent Chest Drain insertion in 'Medicine' at the Leicester Royal Infirmary -** in the event the Medical Registrar at the LRI does not have the required competencies to insert a chest drain, the following will apply;
 - 1. Medical registrar to request ED Registrar or ED Consultant to insert drain. If they are unavailable;
 - 2. Request OOH 2nd Anaesthetic Registrar to insert drain. If they are unavailable;
 - 3. Request assistance from General Surgery Registrar

If any problems are experienced in expediting the above specialties then the **Senior Manager On-call in the Operational Command Team** should be contacted.

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The Respiratory registrar on-call on CDU on bleep 2903 (24/7), Respiratory ward referrals registrar (Monday-Friday 9am-5pm) on 07971 626323 or Thoracic registrar on-call can be contacted on 07535 457043 for advice.

Post drain insertion, the patient will be transferred to ACB (Acute Care Bay) at LRI for care of drain. Drains are required so rarely at the LGH out of hours that no specific pathway is required. The respiratory service is available for advice if required.

6.2 Location of pleural procedures

In order to reduce the risk of iatrogenic infection, pleural procedures should be carried out in a clean room wherever possible, rather than at the patient's bedside. Aseptic technique must be used for all pleural procedures.

6.3 Post procedure care

Patients with chest drains must be cared for on a ward where nursing staff are familiar with intercostal drain management.

6.4 This policy is supported by the following guidelines which must be used in conjunction with this policy

Procedure	Appendix
UHL Pleural Aspiration Guidelines	One
UHL Chest Drain insertion Guidelines	Two

7 PROCESS FOR MONITORING COMPLIANCE

7.1 Audit Process:

The Trust will participate annually in the British Thoracic Society national audit of pleural procedures. The standards measured are those set out by the British Thoracic Society guidelines for pleural procedures, on which this policy has been based and include the following audit criteria:

Element to be monitored	Lead	ΤοοΙ	Frequency	Reporting arrangements	Lead for acting on recommend- ations	Change in practice and lessons to be shared
Consent has been obtained	Consultant Respiratory Medicine	British Thoracic Society	Annually	To Trust Clinical Audit Committee	CMG representatives on Clinical Audit Committee	Within CMG through Clinical Audit Committee and local sub leads
Chest drains are not inserted out of hours	Consultant Respiratory Medicine	British Thoracic Society	Annually	To Trust Clinical Audit Committee	CMG representors on Clinical Audit Committee	Within CMG through Clinical Audit Committee and local sub leads

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Imaging is used to assist in the insertion of the chest drain	Consultant Respiratory Medicine	British Thoracic Society	Annually	To Trust Clinical Audit Committee	CMG representors on Clinical Audit Committee	Within CMG through Clinical Audit Committee and local sub leads

Full audit criteria is available from the following website: <u>http://www.brit-thoracic.org.uk/audit.aspx</u>

8 DEVELOPMENT AND DISSEMINATION PROCESS

The policy and associated guidelines are based on the British Thoracic Society guidelines for pleural procedures. The final document will be available on INsite and will be publicised via the LRI Grand Round.

9. DOCUMENT CONTROL, ARCHIVING AND REVIEW OF THE DOCUMENT

- 9.1 This policy and associated guidelines will be stored on SharePoint and archived through this system
- 9.2 This policy will be reviewed every three years or sooner in response to identified risks or patient care issues.

10 LEGAL LIABILITY

The Trust will generally assume vicarious liability for the acts of its staff, including those on honorary contract. However, it is incumbent on staff to ensure that they:

- Have undergone any suitable training identified as necessary under the terms of this policy or otherwise.
- Have been fully authorised by their line manager and their CMG to undertake the activity.
- Fully comply with the terms of any relevant Trust policies and/or procedures at all times.
- Only depart from any relevant Trust guidelines providing always that such departure is confined to the specific needs of individual circumstances. In healthcare delivery such departure shall only be undertaken where, in the judgement of the responsible clinician it is fully appropriate and justifiable such decision to be fully recorded in the patient's notes.

It is recommended that staff have Professional Indemnity Insurance cover in place for their own protection in respect of those circumstances where the Trust does not automatically assume vicarious liability and where Trust support is not generally available. Such circumstances will include Samaritan acts and criminal investigations against the staff member concerned.

Suitable Professional Indemnity Insurance Cover is generally available from the various Royal Colleges and Professional Institutions and Bodies.

For advice please contact: Assistant Director - Head of Legal Services on Ext 8585

11. EQUALITY IMPACT ASSESSMENT

- 11.1 The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
- 11.2 As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

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12. EVIDENCE BASE AND RELATED POLICIES

This policy has been adapted from the British Thoracic Society Guidelines for Pleural Disease and British Thoracic Society clinical statement on pleural procedures.

Roberts ME, Rahman NM, Maskell NA, Bibby AC, Blyth KG, Corcoran JP, Edey A, Evison M, de Fonseka D, Hallifax R, Harden S, Lawrie I, Lim E, McCracken DJ, Mercer R, Mishra EK, Nicholson AG, Noorzad F, Opstad K, Parsonage M, Stanton AE, Walker S; BTS Pleural Guideline Development Group. British Thoracic Society Guideline for pleural disease. Thorax. 2023 Jul;78(Suppl 3):s1-s42. doi: 10.1136/thorax-2022-219784. PMID: 37433578.

Asciak R, Bedawi EO, Bhatnagar R, Clive AO, Hassan M, Lloyd H, Reddy R, Roberts H, Rahman NM. British Thoracic Society Clinical Statement on pleural procedures. Thorax. 2023 Jul;78(Suppl 3):s43-s68. doi: 10.1136/thorax-2022-219371. PMID: 37433579.

Anticoagulation Bridging Therapy for Elective Surgery and Procedures UHL Guideline (B30/2016) – available on UHL Trust intranet InSite under 'Clinical Guidelines & Policies' tab.

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1. Introduction and Scope

- 1.1 This guideline outlines the indications for pleural aspiration and describes how to undertake the procedure safely.
- 1.2 The guideline applies to all staff within UHL undertaking pleural aspiration in adult patients and medical and nursing staff responsible for their subsequent care.
- 1.3 Pleural aspiration describes a procedure whereby fluid or air is aspirated via a system temporarily inserted into the pleural space. This may be performed for diagnostic purposes (removal of 20-50mls of fluid) or therapeutic purposes (to drain a larger volume of fluid or air) to gain symptomatic relief. It is varyingly referred to in the literature as thoraccentesis, thoracentesis or pleural aspiration.

2. Indications for a Pleural Aspiration

2.1 Pneumothorax

- a) Spontaneous primary pneumothorax (sufficient size to safely intervene)
- b) (Please also consultant the UHL pneumothorax guidelines)

2.2 Malignant pleural effusions

- a) Small volume aspiration for diagnosis
- b) Larger volume aspiration to relieve symptoms of dyspnoea
- c) To evaluate whether non-expandable lung is present to help guide future management (particularly in Malignant Pleural Effusions).

2.3 Pleural effusion associated with sepsis (suspected empyema)

a) Diagnostic for decision to drain

3. Contraindications for a Pleural Aspiration

- 3.1 Non-urgent pleural aspirations should be avoided in anticoagulated patients until the international normalised ratio (INR) is <1.5.
- 3.2 It is not necessary to perform a clotting screen routinely prior to pleural aspiration, unless the patient is on anticoagulants or is suspected to have abnormal clotting (e.g. known liver disease).
- 3.3 If the INR is \geq 1.5 or the platelet count is <50, the advice of the haematologist on call should be sought in order to correct the clotting prior to the procedure.
- 3.4 <u>Stopping & Recommencing anticoagulation</u>: The UHL Anticoagulation Bridging Therapy for Elective & Surgical Policy (on Insite) should be consulted. If the patient is taking a DOAC (direct oral anticoagulant e.g. rivaroxaban etc) then depending on the renal function suggest stopping the DOAC for 24-48hrs prior to the procedure – please consult Appendix 7 or liaise with the on-call haematology registrar for further advice. Recommence DOAC after the procedure if uneventful.

4. Patient Preparation and Consent

4.1 Before performing the procedure, operators should ensure that documented consent is obtained and that they are competent or supervised by a competent individual to do the pleural aspiration. Standardised consent stickers are available to affix to the UHL consent form (Appendix 15) or e-consent can be done via Concentric. The patient should be provided a UHL patient information leaflet on Ultrasound guided diagnostic and therapeutic Pleural Procedures Policy

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pleural fluid aspiration (Appendix 8).

- 4.2 The operator should be aware of the indication for the procedure, whether it is diagnostic or therapeutic and should have all the equipment available. A **Pleural Aspiration Checklist and Report** must be completed for all procedures (Appendix 5).
- 4.3 The following issues must be included in discussion with the patient:
 - a) Pain
 - b) Infection
 - c) Failure of procedure
 - d) Pneumothorax
 - e) Bleeding
 - f) Visceral Injury
 - g) Site / side of the procedure

5. Image Guidance

- 5.1 A recent chest radiograph must be available prior to performing a pleural aspiration.
- 5.2 Bedside thoracic ultrasound guidance is mandatory for all pleural procedures for pleural fluid. The marking of a site for remote aspiration using ultrasound (i.e 'X marks the spot'), is only recommended for large pleural effusions and should be generally be avoided. When this is performed the doctor should accompany the patient to radiology to observe the ultrasound scan and the location of the effusion and positioning of the patient.

6. The Procedure

6.1 Patient position and site of insertion

a) The preferred site for insertion of the needle for pleural aspiration should be the triangle of safety (see figure 1).



Figure 1. The Triangle of safety. The 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.

- b) Patient position is dependent on the operator preference and the site of the pathology. In the case of a posterior lying locule, this may be specific to the image-guided spot where fluid is most likely to be obtained.
- c) In most circumstances, however, the site of insertion of the needle is either in the triangle of safety or the second intercostal space in the mid-clavicular line. The patient may therefore either sit upright leaning forward with arms elevated but resting on a table or bed, thereby exposing the axilla, or lying on a bed semi recumbent or in the decubitus position.

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d) The needle is inserted in the space just above a rib to avoid damaging the neurovascular bundle. It is common practice to insert the needle more posteriorly for a pleural aspiration, but it should be noted that the neurovascular bundle may not be covered by the lower flange of the rib in this position and a more lateral or anterior site of insertion is considered safer.

6.2 Aseptic technique

Pleural aspiration must be a sterile procedure, so must take place in a clean area with sterile technique. The skin must be sterilised with two applications of an alcohol based skin preparation (2% chlorhexidine, 70% isopropyl alcohol).

6.3 Equipment

For a simple diagnostic procedure a 21g (green) needle and a 50ml syringe is sufficient. Pleural aspiration using large bore needles should be avoided. Sterile gloves, a sterile field and skin sterilising fluid are required.

For a therapeutic procedure the Trust approved kit (Rocket Medical Thoracentesis Catheter - 6Fg) should be used.

6.4 Technique

- a) For a diagnostic procedure a syringe attached to a green needle is inserted into the pleural space using the technique described below and 50 ml of fluid should be withdrawn and sent for:
 - Protein
 - Glucose
 - Cytology (25-40ml).
 - MC&S, AFBs. Pleural fluid should be sent in both plain and blood culture bottle tubes (5-10mls) in patients with suspected pleural infection. In cases where volume available does not allow 5–10 mL inoculation, volumes of 2–5 mL should be prioritised to blood culture bottles rather than a plain, sterile container.
 - pH (use blood gas machine) (not if purulent pleural fluid)

Additional Tests-

- If suspecting lymphoma, diagnostic accuracy increases by sending a small fluid sample to the HMDL (Haematological Malignancy Diagnostic Links) lab in a HMDL sample bottle for flow cytometry and cytogenetics. HMDL sample bottles are stored in a refrigerator (prior to obtaining the sample). Sample bottles and the request form should be available from the HMDL Lab which is Located on Level 2, Sandringham Building, Leicester Royal Infirmary (Contact No- 0116 258 6518)
- If suspecting TB, diagnostic accuracy increases by performing a TB PCR test (GeneXpert[®]). This can be handwritten on the MC&S/AFB request form.
- b) Local anaesthesia is not required for a simple diagnostic procedure with a 21g (green) needle, but should be considered if difficulty attaining the pleural space is likely (i.e. with an inexperienced operator or if the patient has a thick chest wall).

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- c) Skin cleansing and an aseptic technique must be used (see 6.2).
- d) In the case of a therapeutic aspiration, local anaesthetic should be administered (1% lidocaine up to a maximum of 3mg/kg, max 250 mg=25 mL)
- e) The pleural space should be aspirated with the needle used to administer the local anaesthetic and the depth of the pleural space can then be confirmed.
- f) The aspiration needle or cannula should then be advanced into the chest, aspirating continually until the pleura is breached and air or fluid are withdrawn, paying close attention to the depth of the pleural space.
- g) The cannula should then be attached to a three-way tap and fluid/air withdrawn into the syringe and expelled via the free port of the three-way tap. This may be into a bag or jug for fluid, or into air or a tube inserted into a bottle under water acting as a one-way seal to prevent air being entrained.
- h) This process should be repeated and continued until the procedure is terminated. The cannula is then removed and a simple dressing applied.
- i) The procedure must be stopped when no more fluid or air can be aspirated, the patient develops symptoms of cough or chest discomfort or 1.5L has been withdrawn.

7. Patient Follow-up

- a) A chest x-ray after a simple pleural aspiration is not required unless air is withdrawn, the procedure is difficult, multiple attempts are required or the patient becomes symptomatic.
- b) A chest x-ray should be performed after a therapeutic aspiration to assess the response.
- c) Recommence any anticoagulation (e.g. DOAC, heparin etc) after the procedure if uneventful. However, if the procedure was not successful or was complicated (e.g. multiple attempts to obtain fluid or air), the risk of subsequent bleeding versus the benefits of anticoagulation should be considered in each individual case.
- d) No specific monitoring is required following routine pleural aspiration. If the patient becomes unwell after a procedure, staff caring for the patient should be aware of the complications of this procedure which include pneumothorax and visceral injury.

8. Documentation

8.1 The practitioner performing the aspiration must document the procedure in the medical notes and ensure the **Pleural Aspiration Safety Checklist & Report (Appendix 5)** is completed and filed in the medical notes.

9. Legal Liability Statement

Guidelines and procedures issued and approved by the Trust are considered to represent best practice. Staff may only exceptionally depart from any relevant Trust guidelines or procedures providing always that such departure is confined to the specific needs of individual circumstances. In healthcare delivery such departure shall only be undertaken where, in the judgement of the responsible healthcare professional' it is fully appropriate and justifiable - such decision to be fully recorded in the patient's notes

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1. Introduction and Scope

- 1.1 This guideline outlines the indications for chest drain insertion and describes how to undertake the procedure safely.
- 1.2 The guideline applies to all staff within UHL undertaking chest drain insertion in adult patients and medical and nursing staff responsible for their subsequent care.
- 1.3 Intercostal chest drain insertion describes a procedure whereby a tube is placed in the pleural space to drain its contents (fluid or air). It remains in place until drainage is complete.

2. Indications for an Intercostal Chest Drain

2.1 Emergency indications

- a) Tension pneumothorax
- b) A pneumothorax in a ventilated patient
- c) Traumatic haemopneumothorax (contact trauma team/thoracic surgery)
- d) A pneumothorax with significant hypoxia

2.2 Other indications for chest drain insertion include:

- a) Malignant pleural effusions
- b) Empyema (these patients should be transferred to GH urgently for management by the respiratory team)
- c) Complicated parapneumonic effusions
- d) Pneumothorax which is persistent or recurrent after simple aspiration
- e) A pneumothorax in a patient >50 years of age with significant smoking history
- f) Bilateral Pneumothorax
- g) Pneumothorax with underlying lung disease
- 2.3 For patients who require a chest drain for these non-urgent conditions, the respiratory registrar on call should be contacted, who will arrange for transfer of the patient if appropriate.
- 2.4 If a patient requires symptomatic relief for a large pleural effusion, a therapeutic pleural aspiration (removing up to 1.5L of fluid) can be performed, and the patient referred to respiratory medicine the following morning.

3. Pre-drainage risk assessment and Contraindications

- 3.1 Any coagulaopathy or platelet defect should be corrected prior to chest drain insertion. (Routine measurement of platelet count or clotting screen is only recommended in patients with known risk factors e.g. known liver disease, on anticoagulants).
- 3.2 Non-urgent chest drain insertion should be avoided in anticoagulated patients until the international normalised ratio (INR) is <1.5. If the INR is ≥ 1.5 or the platelet count is <50, the advice of the haematologist on call should be sought in order to correct the clotting prior to the procedure.
- 3.3 <u>Stopping & Recommencing anticoagulation</u>: The UHL Anticoagulation Bridging Therapy for Elective & Surgical Policy (on Insite) should be consulted. If the patient is taking a DOAC (direct oral anticoagulant e.g. rivaroxaban etc) then depending on the renal

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function suggest stopping the DOAC for 24-48hrs prior to the procedure – please consult **Appendix 7** or liaise with the on-call haematology registrar for further advice

- 3.4 **Recommencing anti-coagulation** depending on the outcome of the procedure the operator should make a risk assessment of subsequent bleeding risk (**low vs high –see Appendix 7**) and recommence anticoagulation according to these recommendations please also consult the **UHL Anticoagulation Bridging Therapy for Elective & Surgical Policy (on Insite)** or liaise with the on-call haematology registrar for further advice if unsure.
- 3.5 The differential diagnosis between bullous disease and pneumothorax requires careful radiological assessment. Similarly it is important to differentiate between the presence of collapse and pleural effusion when the CXR shows a unilateral "whiteout".

4. Patient preparation and Consent

- 4.1 Before performing the procedure, operators should ensure that written consent is obtained (except in the case of a life threatening emergency) and that they are competent or supervised by a competent individual to undertake the procedure. Standardised consent stickers (Appendix 16) are available to affix to the UHL consent form or e-consent can be done via Concentric. The patient should be provided a UHL Chest Drain insertion patient information leaflet (Appendix 9).
- 4.2 The operator should be aware of the indication for the procedure and should have all the equipment available. An **Intercostal Chest Drain Safety Checklist & Report** must be completed for all procedures (Appendix 6).
- 4.3 The following issues must be included in discussion with the patient:
 - a) Pain
 - b) Bleeding
 - c) Intrapleural or wound infection
 - d) Drain dislodgement or blockage
 - e) Failure of the procedure
 - f) Air leak to skin (surgical emphysema)
 - g) Visceral Injury
 - h) Site / side of procedure

5. Image Guidance

- a) A recent Chest X-ray must be available and be reviewed at the time of the drain insertion except in the case of a tension pneumothorax.
- b) Bedside thoracic ultrasound guidance is mandatory for all pleural procedures for pleural fluid and must be undertaken by staff who are trained in thoracic ultrasound as an Emergency level TUS operator as per the British Thoracic Society Training Standards for Thoracic Ultrasound (TUS) or trained in POCUS, FAMUS or FUSIC for safe identifications of pleural effusion intervention).
- c) The marking of a site for remote aspiration using ultrasound, is only recommended for large pleural effusions and should generally be avoided. When this is performed the doctor should accompany the patient to radiology to observe the ultrasound scan, location of the effusion and the positioning of the patient. Remote marking should only be in exceptional circumstances and ideally avoided.

6. Antibiotic Prophylaxis

a) Antibiotic prophylaxis is not recommended for non-trauma patients requiring a chest drain.

b) For trauma patients, especially those with penetrating trauma, prophylactic antibiotics should be considered.

7. The Procedure

7.1 Equipment Required

- a) Sterile gloves and gown
- b) Skin antiseptic solution (e.g., iodine or chlorhexidine in alcohol)
- c) Sterile drapes
- d) Gauze swabs
- e) A selection of syringes and needles (21-25 gauge)
- f) Local anaesthetic (e.g., lidocaine 1%)
- g) Scalpel and blade
- h) Suture (e.g. 0 or 1-0 silk)
- i) Instrument for blunt dissection if required (e.g., curved clamp)
- j) Guide wire and dilators for Seldinger technique
- k) Chest tube
- I) Connecting tubing
- m) Closed drainage system (including sterile water if underwater seal being used)
- n) Dressing

Equipment may also be available in kit form (the trust approved Rocket Medical 12Fg/18Fg chest drain kit has most items for a chest drain insertion).

7.2 Size of drain

Small drains (12Fg) should be used first line for treatment of pneumothorax, free flowing pleural fluid and pleural infection as they are more comfortable than larger bore tubes. Large bore tubes are recommended for drainage of acute haemothorax or empyema.

7.3 Premedication

- a) Chest drain insertion can be a painful procedure and therefore premedication should be considered.
- b) If formal sedation is used during the procedure, this must be given in line with the UHL policy for safety and sedation of Adult patients undergoing diagnostic and therapeutic procedures. Doctors administering conscious sedation must ensure they have had sufficient training in line with this guidance.
- c) Pre-medication could be an intravenous anxiolytic (e.g. Midazolam 1-2 mg titrated to achieve adequate sedation) or analgesic 2.5mg e.g. iv morphine given immediately prior to the procedure or 5- 10mg morphine sulphate oral solution 1 hour prior to the procedure. No single technique has been shown to be clearly superior.
- d) Both these classes of drugs can cause respiratory depression and patients with underlying lung disease (e.g. COPD) must be observed, and reversal agents (e.g. Naloxone or flumazenil) must be immediately available if necessary.
- e) Intravenous access must be maintained throughout the procedure and oxygen saturation monitored continuously.
- f) Sedation should allow the patient to remain conversant throughout the procedure and should be combined with sensitive explanation throughout the procedure with reassurance.
- g) To reduce pain associated with chest drains, analgesia must be prescribed for all patients with a chest drain in place.

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7.4 Patient position and site of insertion

a) The preferred site for insertion of the needle for chest drain insertion should be the triangle of safety (see figure 1).



Figure 1. The Triangle of safety. The 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.

- b) Patient position is dependent on the operator preference and the site of the pathology. In the case of a posterior lying locule, this may be specific to the image-guided spot where fluid is most likely to be obtained.
- c) In most circumstances, however, the site of insertion of the needle is either in the triangle of safety or the second intercostal space in the mid-clavicular line.
- d) The patient may therefore either sit upright leaning forward with arms elevated but resting on a table or bed, thereby exposing the axilla, or lying on a bed.



e) The needle is inserted in the space just above a rib to avoid damaging the neurovascular bundle. It is common practice to insert the needle more posteriorly for a pleural aspiration, but it should be noted that the neurovascular bundle may not be covered by the lower flange of the rib in this position and a more lateral or anterior site of insertion is considered safer.

7.5 Aseptic technique

Chest drain insertion must be a sterile procedure, so must take place in a clean area with sterile technique. Gloves and a gown must be worn and the patient should be covered by a sterile drape. The skin must be sterilised with two applications of an alcohol based skin preparation (2% chlorhexidine, 70% isopropyl alcohol).

7.6 Anaesthesia

Local anaesthetic (1% lidocaine – up to a maximum of 3mg/kg, max 250 mg=25 mL) should be infiltrated into the skin (using an orange needle) and more deeply to anaesthetise the intercostal muscles and the pleural surface (using a green needle). (The volume is considered to be more important than the dose, so it is possible to mix 10mls of 1% lidocaine with 10mls of 0.9% sodium chloride in a 20ml syringe).

7.7 Technique

a) Immediately before the procedure, the identity of the patient must be checked and the site and side for insertion of the chest tube confirmed by reviewing the clinical signs and

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the chest x-ray. If the tube is being inserted for fluid, an ultrasound scan should be performed at the bedside (see section 5).

- b) During chest drain insertion, an attempt to aspirate the pleural contents with a small needle must be made, usually whilst administering local anaesthetic. Never proceed if you cannot aspirate pleural fluid (or air in the case of a pneumothorax).
- c) Chest drain insertion should be performed without using substantial force.
- d) In the case of a seldinger chest drain:
 - i. a needle and syringe are used to localise the position for insertion by identification of pleural fluid or air.
 - ii. The pleural contents should be aspirated and a note taken of the depth of the needle when it enters the pleural space.
 - iii. A guidewire is then gently passed down the hub of the needle. The needle is removed (leaving the guidewire in place) and a small skin incision is made.
 - iv. The dilator is gently passed over the guidewire using a slight twisting action. Force is unnecessary and the dilator only needs to be passed 1cm beyond the depth of the pleura as measured using the introducing needle. By holding the dilator firmly at this depth, excessive insertion depth (and subsequent visceral injury) can be avoided. A small (12Fg) seldinger chest drain will have 1 dilator.
 - v. The tract is further widened using a series of enlarging dilators up to the size of the drain in cases where the drain is bigger than 12Fg. The chest drain tube can then be passed into the thoracic cavity along the wire. The depth of insertion should be enough to ensure that the last drainage hole is well within the pleural space but does not require insertion to the hilt.
 - vi. The guidewire is then removed, leaving the drain in place. The drain should be attached to an underwater seal and secured in place using a stay-in suture (0 or 1-0 silk suture) and the dressing that is included in the drain kit. It is also a good practice to anchor the drain tube to the patient's body using a "mesentery" dressing.

e) To insert a large bore tube:

- i. An incision should be made which is similar to the diameter of the tube being inserted. Blunt dissection is used to enter the pleural cavity.
- ii. Using a Spencer Wells clamp or similar, a path is made through the chest wall by opening the clamp to separate the muscle fibres.
- iii. For a large chest drain (>24F), similar in size to the finger, this tract should be explored with a finger to ensure that there are no underlying organs which might be damaged by tube insertion.
- iv. The chest tube should be inserted through the chest wall. The trocar should not be used as this has been linked to visceral injuries and excessive force should never be used.
- v. The chest tube should be aimed apically for a pneumothorax and basally for fluid
- vi. In the case of large bore chest drains, 2 sutures (0 or 1-0 silk suture) are usually inserted, the first to close the wound after drain removal and the second to secure the drain. Purse string sutures should not be used.
- vii. The chest tube should be attached to an underwater seal.

7.8 Drain Position

- a) Ensure a post drain insertion chest x-ray is requested and reviewed
- b) If malposition of a chest drain is suspected, (e.g. a drain fails despite an apparent acceptable position on CXR), a CT scan is the best method to demonstrate the cause. A

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chest drain may be intraparenchymal or extrapleural and the CXR may give no indication of its malposition.

- c) If possible the tip of a drain should be aimed apically to drain air and posteriorly to drain fluid but an effectively functioning drain should not be repositioned because of a suboptimal radiographic appearance.
- d) A chest drain may be withdrawn to correct malposition, but must never be pushed in further because of risk of infection.

7.9 Drainage

- a) A chest drain should be connected to a drainage system that contains a valve mechanism to prevent fluid or air from entering the pleural cavity. This may be an underwater seal, flutter valve or other recognised mechanism.
- b) Aseptic non-touch technique (ANTT) should be employed when changing a chest drain bottle/underwater seal drain or drain tubing.
- c) Drainage of a large pleural effusion must be controlled to prevent re-expansion pulmonary oedema (RPO). The patient must be monitored closely for the first 15 minutes following insertion of the chest drain. **Do not drain more than 1.5 litres of fluid over the first hour** (depending on your patient e.g. frailty, elderly etc this may need to be less e.g. 500ml over 20-30mins then repeated after 20-30 minutes). The drain should then be clamped, (or via the 3 way tap closed) for 1 hour. After 1 hour the drain should be unclamped and a further 500ml of fluid drained. This process should continue until all of the fluid has been drained slowly.
- d) When draining a pneumothorax, clamping a bubbling chest tube should be avoided unless under specialist pleural supervision and in specific circumstances only as there is a chance of potentially causing a tension pneumothorax.

7.10 Monitoring (also see Section 11 – Nursing Care)

- a) All patients with chest drains should be cared for by a team experienced with their management and nursed on a ward familiar with their care.
- b) The Trust bedside chest drain observation chart (electronic or paper) must be used for every patient with a chest drain in situ (Appendix 4).
- c) The frequency of observations depends on clinical need. When a large amount of fluid is being drained, there is a potential risk that the patient could develop hypotension. Therefore, a full set of observations (Pulse, BP, O₂ sats and respiratory rate) must be performed every 15 minutes for the first hour after insertion of a chest drain for a large pleural effusion. There should be continuous direct observation of the drainage for the first 15 minutes as this is the period when complications can arise and rapid drainage is likely to occur.
- d) If the patient becomes unwell after a procedure, staff caring for the patient should be aware of the complications of this procedure which include visceral injury in the case of drain misplacement, reperfusion pulmonary oedema (RPO) and contact the operator or a member of the medical staff.
- e) Care should be taken if considering anticoagulation following chest drain insertion, especially if the procedure was not successful or was complicated (e.g. multiple attempts to obtain fluid or air).
- f) Recommencing anticoagulation depending on the outcome of the procedure the operator should make a risk assessment of subsequent bleeding risk (low vs high (Appendix 7) and recommence anticoagulation according to these recommendations please also consult the UHL Anticoagulation Bridging Therapy for Elective & Surgical Policy (on Insite) or liaise with the on-call haematology registrar for further advice if unsure.
- g) If patient is not on any anticoagulants pre-procedure, prophylactic anticoagulation needs to be prescribed post-procedure as per the trust policy.

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h) It is good practice that the operator inserting the chest drain to prescribe 30ml sodium chloride (0.9%) drain flushes every 6-8 hours to ensure the drain is kept patent.

7.11 Troubleshooting

Surgical Emphysema

- a) The development of surgical emphysema following chest drain insertion for pneumothorax is common. In certain situations, substantial amounts of air can accumulate subcutaneously.
- b) Risk factors include drain blockage, poor drain placement/fixation (leading to migration of the side-holes subcutaneously) in the context of a large air leak.
- c) The diagram below adapted from the BTS clinical statement for pleural procedures summarises the management of problematic surgical emphysema.



Non-Functional drain

- a) The cessation of swinging of liquid in the drain tubing could be due to drain blockage which is often resolved flushing the drain with sodium chloride (0.9%).
- b) The full length of the drain and the tubing should be inspected to rule out any kinking as a cause of drain non-function.

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- c) The assessment of a non-functional drain is summarised below which is adapted from the BTS clinical statement for pleural procedures.
- d) In cases of a non-functional intercostal drain where another drain is required, the old track must be avoided when inserting the new drain because of the risk of infection.



Chest Drain wound leakage

- a) Leakage of pleural fluid around the drain is usually seen with large volume pleural effusions with wide thoracostomy wounds and is normally exacerbated when the drain is clamped or blocked.
- b) In most cases, the leakage ceases with thorough drainage of the effusion.
- c) If a blocked drain is suspected, flush the drain with 30mls of sodium chloride (0.9%) and check the tubing for any kinks.
- d) The risk of persistent wet dressings is that it could lead to chest wall cellulitis.
- e) A simple interrupted suture can be used around the drain site to narrow the aperture around the drain.

8. Documentation

8.1 The practitioner inserting the chest drain must document the procedure in the medical notes and ensure the **Intercostal Chest Drain Checklist & Report (Appendix 6)** is completed and filed in the medical notes. Clear written and verbal information needs to be given to nursing staff on fluid drainage management.

9. Suction

- 9.1 Routine use of thoracic suction should be avoided given a lack of data demonstrating clinical benefit.
- 9.2 If a pneumothorax fails to resolve following chest drain insertion, the drain can be placed on suction (5-10cm H₂O). When chest drain suction is required a high volume/low pressure system should be used or alternatively, digital suction devices such as e.g. Thopaz by Medela.
- 9.3 Chest drains must not be connected directly to the high negative pressure available from wall suction.

10. Ongoing Analgesia

Having a chest drain in place can be painful and adequate analgesia should be prescribed on a regular basis.

11. Nursing Care

Patients must be managed on a ward familiar with chest tubes and the person inserting the chest tube must check this with the Nurse in Charge prior to the procedure. Instruction to and appropriate training of the nursing staff is imperative.

11.1 Prior to the procedure:

- Ensure consent obtained and safety checklist completed
- Check that the doctor has all the equipment required to undertake the procedure safely
- Check that an aseptic technique is maintained
- Ensure that the patient is comfortable and well positioned
- Make sure adequate analgesia has been given
- If there are any concerns inform the doctor performing the procedure

11.2 During the procedure:

- Stay with the patient
- Monitor for signs of distress or pain
- Monitor pulse, BP, respiratory rate and O₂saturation
- Give prescribed oxygen if required
- If there are any concerns inform the doctor performing the procedure

11.3 Following the procedure:

- Patient comfort, NEWS2 score and fluid drainage must be closely monitored and recorded post-procedure (on electronic or paper observation chart) for the first hour as this is the greatest risk period for the development of reperfusion pulmonary oedema (RPO).
- Observations every **15 min for the first hour** is advised and drainage should be **continually supervised for the first 15 minutes** so any deterioration in the patient's condition can be acted on quickly as this is the period when complications can arise and rapid drainage is likely to occur. No transfer should be taken during that time.
- After 15 minutes turn the drain to the off position using the 3-way tap whilst transporting the patient from the procedure room to their bed space (if undertaken away from the bedside). Movement can increase the rate of drainage. Once escorted back to the bed space handover to the nursing staff.
- Observations should occur every hour for the first 3 hours and then observations every 4 hourly until the drain is removed.
- Stay with the patient for at least 15 minutes to monitor for signs of distress orpain.
- Monitor drainage and document on the chest drain observation chart.
- Ensure that the patient is informed to keep the chest drain bottle positioned below the level of the chest to prevent any backflow of fluid.
- The drain bottle must be kept upright at all times.
- Patients should be encouraged to take responsibility for their chest tube and drainage system.
- Ensure the drain is patent and that there is adequate water in the system to cover the end of the tube does the fluid in the tubing swing when the patient breathes in and out? If the fluid in the tubing is not swinging it may be blocked or have come out of position and the nurse must inform the Medical staff.

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- Plan for controlled pleural drainage (e.g. 500ml per hour) with the use of a 3-way tap for Seldinger drains (not clamping) see below
- If the drain has been put in for a pleural effusion there is a risk of low blood pressure and reperfusion pulmonary oedema if too much fluid drains too quickly. Therefore, after a maximum of 1.5 litres of fluid over an hour has been drained, the tube should be clamped for 1 hour. After 1 hour has passed, the tube should be unclamped and a further 500 m I drained. The process of clamping and unclamping should continue until all the fluid has been drained.
- If the drain has been put in for a pneumothorax the bottle should be observed for bubbling and the presence of bubbling should be recorded on the observation chart. If bubbling is not seen, ask the patient to cough.
- The nursing team should ensure that the drain is kept patent by flushing the drain (towards the chest) with 30ml of sodium Chloride 0.9% every 6-8 hours.
- Drains should be checked daily for wound infection, fluid drainage volumes and documentation for swinging and/or bubbling.
- If there are any concerns inform the doctor performing the procedure

11.4 Controlled pleural drainage & Red Flags

Always ensure controlled pleural drainage by using a 3-way tap to open and close the drain. The recommended standard approach is for nursing or AHP staff to stop drainage by closing the three way tap if the patient develops any of the key red flags/triggers below;

- Pain or chest discomfort
- Persistent cough, worsening breathlessness or vagal symptoms
- A deteriorating NEWS2 score, and/or when 1500ml has been removed
- Reopen the tap after 1 hour, allowing no more than 500ml to be removed per hour after this.
- When less than 500ml per hour draining, leave on free drainage

If there are any concerns then contact the doctor performing the procedure or the on-call respiratory registrar/Consultant

12. Removal of the Chest Drain

- 12.1 The timing for removal of the chest drain is dependent upon the original reason for insertion.
- 12.2 In the case of pneumothorax, the drain should not usually be removed until bubbling has ceased and the CXR demonstrates lung re-inflation. The chest drain should not be clamped before removal.
- 12.3 Chest drain removal must be performed using aseptic technique. The chest drain should be removed while the patient performs the valsalva manoeuvre or during expiration with a brisk firm movement whilst an assistant ties the previously placed closure suture.

13. Legal Liability Statement

Guidelines and procedures issued and approved by the Trust are considered to represent best practice. Staff may only exceptionally depart from any relevant Trust guidelines or procedures providing always that such departure is confined to the specific needs of individual circumstances. In healthcare delivery such departure shall only be undertaken where, in the judgement of the responsible healthcare professional' it is fully appropriate and justifiable - such decision to be fully recorded in the patient's notes.

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Flow Chart for the Insertion of an Intercostal Chest Drain



Pleural Procedures Policy



Association of Respiratory University Hospitals of Leicester

NHS Trust

Good Practice Points

- Ensure effective communication between clinical personnel before, during, and after procedure to minimise the risk of adverse events.
- Carefully assess the risks/benefits for out of hour's chest drain insertion.
- Patients with chest drains should be managed on specialist wards by staff trained in chest drain management.

Pre-procedure

- A Local Safety Standard for Invasive Procedures (LocSSIP) checklist must be completed for all pleural procedures.
- Review the patients' observations/ National Early Warning Scores 2 (NEWS2)
- Review up to date chest imaging and confirm side of abnormality.
- Review allergies and medication (specifically antiplatelet, anticoagulation etc.).
- Review blood clotting and where possible, any coagulopathy or platelet defect should be corrected.
- Ensure written consent has been obtained or act in the best interests of those who lack capacity.
- Point of care ultrasound should be used to guide chest drain placement (except in pneumothorax).

Post-procedure

- Ensure continual direct observation for the 15 mins following chest drain insertion and no transfer should be taken during that time.
- Ensure that the patient is informed to keep the chest drain bottle positioned below the level of the chest to prevent any backflow of fluid.
- Assess the patients comfort using the most appropriate discomfort scale for the target population and ensure that analgesia has been prescribed and administered.
- Ensure a post drain insertion chest radiograph has been requested and reviewed.
- The recommended standard approach is for nursing or AHP staff to stop drainage by closing the three way tap initially after 1 hour, or at any point earlier if the patient develops any of the key red flags/triggers below:
 - Severe pain or chest discomfort
 - Persistent cough, worsening breathlessness, or vagal symptoms
 - A deteriorating early warning score, and/or
 - Drainage of up to 1500ml (in selected cases, 1000ml drainage may be appropriate e.g. in smaller adults)
- The tap may be reopened after 1 hour, allowing up to 500ml per hour to drain before returning to free drainage
- Follow the local emergency escalation policy in the event of patient deterioration and inform a senior member of the medical team urgently.

Association of Respiratory Nurse Specialists (ARNS) _Exemplar Bedside Observation Chart _Chest Drain_ V5 November 2020 This document should be reviewed annually and relevant research and national updates must be considered prior to endorsement. Review date November 2021

Observinion en	ATA I	Pati	ent Identifi	cation Label
Chart number:				
Date & Time:				
Drain inserted by (name/	grade):			
Supervisor if necessary (n	ame/ grad	e):		
Side of drain:	Left		Right	
Drain indication:	Pleural eff	usion	Pneumot	horax
	Pleural info	ection	Haemoth	orax
	Other indi	cation:		
Technique:	Seldinger		Blunt dise	section
	IR guided		Other	
Ultrasound guided:	Yes	No		N/A
Drain size:	12F	18F		Other
Suction required:	Y	Ν		N/A
Chest drain flushing:	Y	Ν		N/A
Timing of flushing:	BD	TDS		QDS
Consider talc pleurodesis:	Y	N		N/A
*Ensure sodium chloride 0	.9% intra-p	leural flush ar	nd/or sterile	talc is prescribed and

available for use if indicated*

CHEST DRAIN

OBSERVIATION CHART

Drain lot number/ sticker:

Frequency	Date and time	Patient comfort	Swinging	Bubbling	Drainage type	Drain Site satisfactory	Tubing and connections intact	Underwater seal intact	Bottle changed	Prescribed suction setting	* Volume saline flush if indicated	* Volume pleural fluid drained	Add both volumes together for cumulative (total) drained	Signature/ initials
Observations and chest drain check frequency		0 = no discomfort 10 = severe discomfort	Y/N	Y/N	See key below	Y/N	Y/N	Y/N	Y/N	kilopascal (KPa)	millilitre (ml)	millilitre (ml)	millilitre (ml)	
Continual direct observation for														
first 15 mins then														
every 15 mins for														
Fvery hour for the														
next 3 hours														
4 hourly														

- Key: Serous (straw/ yellow/ amber coloured) = S Turbid (cloudy, green, infected looking) = T
- Haemoserous (lightly bloodstained) = HS Chyle (white/ pink milky looking) = C

Heavily bloodstained = HBS Other = document finding Empyema (frank pus) = E

NB: Nursing staff must ensure <u>controlled pleural drainage</u> using the 3 way tap as outlined in the good practice points until controlled free drainage is achieved. Closing a 3 way tap in a pneumothorax can lead to serious complications and should only be performed in daytime hours upon a Consultants advice.

Association of Respiratory Nurse Specialists (ARNS) _Exemplar Bedside Observation Chart _Chest Drain_ V5 November 2020 This document should be reviewed annually and relevant research and national updates must be considered prior to endorsement. Review date November 2021

	Patient ID Label or write name an Hospital No.: Name:	d number	Safer Surge	ery Checklist	LocSSIPs Ur	niversity Hospitals of Leicester NHS Trus
	Telephone No. 1:		Invasive Procedu	re Safety Checklist	Assistant completing the form:	
	lelephone No. 2:		Pleur	ai Aspiration (Adult)	Operator inserting line:	
]	Place undertaken: Treatment Re	oom Bedside	Radiology 🗌 🔰 1	Theatres ICU	Endoscopy	ED
	BEFORE THE PRO	CEDURE/SIGN IN	TIME	OUT	SIGN	OUT
	Prior to list with all team mem	bers	Verbal confirmation between before start of procedure	team members	Please undertake the below a	nd handover to nursing team
	Confirm patient's Name, DOB and	Hospital	Aseptic technique: Sterile	Gown Gloves	Order post procedure CXR and har	ndover for review Yes No
	Number with patient and against v Have all the team members introd	wristband res No N/A	At least two applications of Chloro	prep Yes No	Ensure specimens are correctly lab	oelled Yes No N/A
	themselves and role	Yes No	Sterile field protected by drapes	Yes No	Prescribe analgesia	Yes No
	(ICU, unconscious)	Yes No	Side: Left Right Site:	or fiuld with local anaesthetic	every 15 mins for 1 hour then hou	s: rly for 2 hours, then 4 hourly
	Indication: Air	Fluid Both	Lignocaine 1% 2%	(mls)	Observations: BP SpO2	2 FiO2 HR
	Radiology reviewed: CT		Adrenaline present with lignocain	e Yes No	Low running stock items (<3) orde	red urgently: Yes No
	Confirm side of procedure:	Left Right	Concentration:		Are there procedural problems that	at need follow-up Yes No
	Observations: BP SpO2	HOZ HR	Fluid appearance:		If anticoagulation has been stopp	ped, undertake a 'bleeding risk
	(If on anticoagulation and medication (If on anticoagulants please consult the	ion checked: fes No	Samples: Biochemistry 0	Tytology MC&S	consult the UHL Anticoagulation Bridain	na Policy on INsite (document plan below)
	UHL Anticoagulation Bridging Policy on	INsite)	Aspiration kit used:		Recommence anticoagulation plan	n:
	Platelets PT		Size: Man	ufacturer:	Doctor inserting drain:	Grade:
	Consent: Written	Verbal Part IV	Amount aspirated initially:	(mls)	Signature:	Date:
	Thoracic US for fluid done:	Yes No N/A	Complications: Pain (0-10)		Supervised: Yes No	Assistant: Yes No
	Thoracic US findings:	Echoic Anechoic	Other:		Name: Grade:	Signature:
	Effusion depth (cm)		-			
	Other findings:				TEAM D	DEBRIEF
					Any concerns from Team Members the procedure?	throughout Yes No
					If Yes, please identify with follow u	p actions Yes No
	Realtime US Immediate U	IS marking	1			
41 7)(5	Read out by: (PRINT)		Read out by: (PRINT)		Read out by: (PRINT)	
11214	Signed:	Date:	Signed:	Date:	Signed:	Date:
				-		

"Based on the WHO Surgical Safety Checklist, URL http://www.who.int/patientsafety/safesurgery/en, © World Health Organization 2008 All rights reserved"

	Patient ID Label or write name and number Hospital No:	Safer Surge	ery Checklist	LocSSIPs Ur	niversity Hospitals of Leicester NHS Trus
	D.O.B.: Sex: Telephone No. 1: Telephone No. 2:	Invasive Procedur Intercostal Chest Dr	re Safety Checklist rain Insertion (Adult)	Assistant completing the form: Operator inserting line:	
	Place undertaken: Treatment Room Bedside	Radiology	Theatres ICU	Endoscopy	ED
	BEFORE THE PROCEDURE/SIGN IN	TIME	OUT	SIGN	OUT
	Prior to list with all team members	Verbal confirmation between before start of procedure	team members	Before patient or team memb	ers leave room
	Confirm patient's Name, DOB and Hospital	Aseptic technique: Sterile	Gown Gloves	Order post procedure CXR and ha	ndover for review Yes No
	Number with patient and against wristband Yes No N/A	At least two applications of Chloro	oprep Yes No	Start chest drain chart	Yes No
	themselves and role Yes No	Sterile field protected by drapes	Yes No	Prescribe analgesia	Yes No
	(ICU, unconscious) Yes No	STOP if unable to aspirate air	or fluid with local anaesthetic	Chest drain care leaflet given to pat	bent/explained Yes No (ICU)
	Indication: Air Fluid Both	Side: Left Right Site:		Observations: PP SpO	
	Radiology reviewed: CT CXR	Lignocaine 1% 2%	(mls)	Fluid drainage instructions confirm	ed to pursing staff. Ves No
	Confirm side of procedure: Left Right	Adrenaline present with lignocain	e Yes No	Drain no more then 1500mls of fluid at any o	one time. Stop drainage by closing tap if
	Observations: BP SpO2 FiO2 HR	Concentration:		patient develops pain, coughing, breathless	hess or 1500mis drained for 2 hrs, then re-open
	Patient's coagulation and medication checked: Yes No	Fluid appearance:		Low running stock items (<3) orde	red urgently: Yes No
	(If on anticoagularits please consult the UHL Anticoagulation Bridging Policy on INsite)	Samples: Biochemistry 0		Are there procedural problems that	at need follow-up Yes No
	Platelets PT	Amount drained initially:	(mis)	If anticoagulation has been stopp	ped, undertake a 'bleeding risk
	Consent: Written Verbal Part IV	Drain secured: Suture Dres	sina	assessment' on when anticoagula	ation should recommence -
	Thoracic US for fluid done: Yes No N/A	Closing mattress (> size 18) placed	d Yes No	Recommence anticoagulation plag	ng Policy on Make (document plan below)
	Thoracic US findings: Echoic Anechoic	Complications: Pain (0-10)		Doctor inserting drain:	Grade:
	Effusion depth (cm)			Signature:	Date:
	Other findings:	Other:		Supervised: Yes No	Assistant: Yes No
				Name: Grade:	Signature:
				TEAM D	DEBRIEF
				Any concerns from Team througho	out procedure? Yes No
es.	Realtime US Immediate US marking	Guidewire removed:	Yes No N/A	If Yes, please identify with follow u	p actions Yes No
4168	Read out by: (PRINT)	Read out by: (PRINT)		Read out by: (PRINT)	
11210	Signed: Date:	Signed:	Date:	Signed:	Date:

"Based on the WHO Surgical Safety Checklist, URL http://www.who.int/patientsafety/safesurgery/en, © World Health Organization 2008 All rights reserved."

Peri-operative Management of Direct Oral Anticoagulants (Elective)

Peri-operative management of DOACs is influenced by :

- 1. Type of DOAC
- 2. Patient co-morbidities
- 3. Patient renal function
- 4. Time of ingestion of last dose
- 5. Peri-operative bleeding risk of procedure
- 6. Timing of operation (emergency, elective)

Pre-operative suspension of DOAC

	DABIO	GATRAN	RIVAROXABAN, APIXABAN & EDOXABAN		
	Low	High	Low	High	
CrCl (ml/mim)	bleeding risk	bleeding risk	bleeding risk	bleeding risk	
≥ 80 ml/min	Omit 24 hr	Omit 48-72 hr	Omit 24 hr	Omit 48 hr	
≥ 50-79 ml/min	Omit 36 hr	Omit 72-96 hr	Omit 24 hr	Omit 48-72 hr	
≥ 30-49 ml/min	Omit 48 hr	Omit 96 hr	Omit 24 hr	Omit 72-96 hr	
≥ 15-29 ml/min	NA	NA	Omit 48 hr	Omit 120 hr	

Post operative management

LOW BLEEDING RISK	HIGH BLEEDING RISK				
	Low thromboembolic risk	High thromboembolic risk			
	Ļ	PROPHYLACTIC LMWH: starting 24 hr post procedure (provided haemostasis is secure) then every 24 hr until resumption of DOAC			
Resume DOAC 6-8 hr	Resume DOAC 48-72 hr	Resume DOAC 48-72 hr			

Author P K Mensah LRI March 2016 (adapted from Faroni et al, Critical Care (2015)

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Having a diagnostic or therapeutic pleural aspiration to remove fluid from around your lung

Respiratory Department	Last reviewed:	September 2023
Respiratory Department	Next review:	September 2026
Information for Patients	Leaflet number:	981 Version: 2



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Introduction

This leaflet is for patients who are to have a diagnostic or therapeutic pleural aspiration.

What is a pleural aspiration?

A pleural aspiration (thoracentesis) is a procedure that removes fluid from the space between the lungs and the chest wall (the pleural space or cavity). A **diagnostic** pleural aspiration takes a small volume (usually 20 to100ml) of fluid so tests can be done on the fluid. A therapeutic pleural aspiration removes a larger volume of fluid (up to 1.5 litres). This is to improve breathlessness as well to allow tests to be done on the fluid sample taken.



Image courtesy of BTS pleural diseases guideline 2010

Why do I need a pleural aspiration?

Between the 2 layers of lung, there is a very small space (pleural space) which is usually almost dry. In your case fluid has collected in this space. If there is a lot of fluid then the lung cannot work properly. This makes you short of breath.

A diagnostic pleural aspiration allows a sample to be taken to find out why this fluid is there and plan treatment. A therapeutic aspiration also removes a larger amount of fluid to improve your breathing.

What are the benefits of the pleural aspiration?

Removal of the fluid aims to improve your breathlessness. Taking a sample of the fluid also lets it to be tested in a few ways to find out why the fluid is building up.

There are a few possible reasons for this fluid to build up, including:

- infection such as pneumonia or possibly tuberculosis (TB).
- cancerous deposits in the lining of the lung.

- inflammatory processes (such as related to rheumatoid arthritis).
- as a result of processes in other organs, such as heart failure or kidney disease.
- build-up of fluid after heart surgery.

What are the risks of the procedure?

This is a very safe procedure with few risks. The doctor doing the procedure will discuss the risks with you and ask you to sign a consent form. The more common side effects are:

- pain: sometimes the injection of local anaesthetic can be sore. There can be a slight "catch" as the needle enters through the lining of the lung (this area can be difficult to numb).
- bleeding: there is a slight risk of bleeding caused by the needle used for the sample. The
 place that is chosen for the sampling aims to reduce the risk of bleeding.
- infection: the procedure is done in a sterile way to reduce any risk of infection in the fluid.
- collapse of lung: where air collects into the pleural space. This can resolve itself or may need treatment with a chest drain.
- organ puncture: this is when the needle used accidently catches the lung itself or another
 organ such as the liver or spleen. This risk is reduced by using an ultrasound at the time to
 find the best site for sampling. The risk of this is very low.

How is pleural fluid aspiration carried out?

- The procedure will be done by a specialist doctor or a trained specialist nurse in the procedure room.
- You will be able to ask any questions.
- You will need to sign a consent form if you are happy to go ahead.
- You will sit on the end of the bed. Your head and arms will rest on a pillow on a table in front.
- The best site for the procedure is found using an ultrasound scan machine. This scan is not
 invasive and will not hurt.
- Your skin is cleaned with an alcohol cleaner to kill any germs.
- A local anaesthetic is then injected to numb the area. This can sting for a short time but does not last long.
- The doctor inserts a thin needle or narrow tube through the chest wall into the pleural space, and any fluid or air is removed.

How long will it take?

The procedure itself is fairly quick. A diagnostic aspiration alone takes about 15 minutes. A therapeutic aspiration takes longer because more fluid is being removed.

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The whole procedure takes about 45 minutes. This includes

- the time taken to do the ultrasound scan,
- explain the procedure,
- complete the consent form
- and take the fluid sample.

Aftercare advice

After the procedure a small dressing will be put over the site. This can be taken off after 24 hours.

Your results

Your sample will usually take 7 to 10 days to be processed. You will be seen in clinic for the results.

If you have any issues you should either

- contact your GP explaining that you have had a pleural aspiration,
- or telephone your consultant's secretary (this number can be found at the top of your clinic letter).
- If out of hours, or over a weekend, you can come to the Clinical Decision Unit, Ward 19, at Glenfield Hospital.

Contact details

LEICESTER'S

RESEARCH

Secretary to Consultant:	0116 258 3488
Pleural Specialist Nurse:	0116 258 3975
Pleural Service Co-ordinator:	0116 250 2474

اگر آپ کو یہ معلومات کسی اور زبان میں درکار ہیں، تو براہِ کرم مندرجہ ذیل نمبر پر ٹیلی فون کریں۔ علی هذه المعلومات بلغةٍ أُخرى، الرجاء الاتصال علی رقم الهاتف الذي يظهر في الأسفل જો તમને અન્ય ભાષામાં આ માફિતી જોઈતી હોય, તો નીચે આપેલ નંબર પર કૃપા કરી ટેલિફોન કરો

ਜੇ ਤੁਸੀਂ ਇਹ ਜਾਣਕਾਰੀ ਕਿਸੇ ਹੋਰ ਭਾਸ਼ਾ ਵਿਚ ਚਾਹੁੰਦੇ ਹੋ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਹੇਠਾਂ ਦਿੱਤੇ ਗਏ ਨੈਬਰ `ਤੇ ਟੈਲੀਫੋਨ ਕਰੋ। Aby uzyskać informacje w innym języku, proszę zadzwonić pod podany niżej numer telefonu

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Having a chest drain inserted to remove air/fluid from around your lung

	Produced:	August 2022
Respiratory Medicine	Review:	August 2025
Information for Patients	Leaflet number: 1326 Version: 1	

Introduction

This leaflet gives you information about having a chest drain inserted.

What is a chest drain?

A chest drain is a tube which is placed between the ribs and into the space between the lung and the chest wall (pleural space). The tube is attached to a bottle and will allow your lung to re-expand. This is a common procedure.

Why do I need a chest drain?

There are a few different reasons why people need to have a chest drain inserted. This may be because you have a:

- Pneumothorax air entering the pleural space.
- Pleural effusion fluid in the pleural space.
- Empyema pus in the pleural space.
- Haemothorax blood in the pleural space.

The diagram on the next page shows air trapped around the lung or fluid around the lung

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Who will insert my chest drain?

Your drain will be put in on the ward by an appropriately qualified and experienced doctor or nurse. We are a teaching hospital, sometimes a qualified trainee doctor may insert the drain, but they will always be supervised by a doctor who is already fully trained in the procedure.

Where in the hospital will my chest drain be put in?

Normally, your chest drain will be put in on the ward.

Will I need to stay in hospital whilst my chest drain is in?

Yes.

How will the chest drain be put in?

- You may be given painkillers about 30 minutes before the procedure.
- You will be asked to sit with your head and arms resting on a pillow placed on a table, or to lie on the bed with your arm above your head.
- The doctor will decide the best position on for your 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 helps 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.

- The skin will be cleaned with an antiseptic lotion and sterile towels placed around the area.
- You will have an injection of local anaesthetic to make the area numb. A small cut is made in the chest. The drain is inserted through this. It is normal to feel a sensation of pressure as the drain is inserted, but if you feel any pain or discomfort let the doctor know.
- The drain will be stitched to your skin to keep it firmly in place. A dressing will be placed over the area.
- The other end of the drain will be attached to a special drainage bottle.
- After your chest drain has been put in, you will have a chest X-ray to check that the tube is in the right place.
- The whole procedure usually takes about 20 to 30 minutes.

What are the risks of inserting a chest drain?

- Pain although painkillers and local anaesthetic are given, some people do have pain during or after the procedure. You can have more painkillers if you need them.
- Bleeding a small amount of bleeding around the site is expected and usually resolves quickly without treatment. More serious bleeding into the chest or damage to other organs in the chest is extremely rare.
- Infection there is a slight risk of introducing infection into the chest which sometimes
 needs treatment with antibiotics. There is also a slight risk of a skin infection around the
 wound where the drain enters the chest.
- Air leak sometimes there may be a leak of air from the chest into the skin around where the drain enters the chest. This is often noticed as a 'crunchy sound' on pressing the skin around the drain.
- Misplacement very rarely the drain may be put in the wrong place (misplaced) and cause damage to other nearby organs. This may be the lung itself, the liver, spleen or heart depending on which side of the chest the drain is inserted.
- Drain failure, dislodgement or blockage sometimes the drain may dislodge and fall out, become blocked or not work

Will it be uncomfortable once the drain is in place?

Some patients do complain of pain, discomfort or aching around the tube. You will be given regular painkillers, but please tell your nurse if you have any discomfort.

Suction

Sometimes a lung needs some help to re-expand. The drainage bottle can be connected to a suction unit on the wall. The gentle suction provided will help the lung to re-expand.

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Can I move around?

You can move and walk around with a chest drain but you must remember to carry the drainage bottle with you. Always carry the bottle below level of your waist.

If the drain is on suction it maybe necessary for you to remain by the bedside. Ask the nurse looking after you for advice.

What can I do to help?

You can help by trying to breathe deeply, cough and move around regularly to help drain the fluid or air, and to help your lungs to expand. It is also helpful to tell the nurse or doctor if you are in pain or have any discomfort.

How long will my chest drain be in for?

The chest tube usually remains in place until the X-rays show that all the blood, fluid, or air has drained from the chest and the lung has fully re-expanded.

Removing the drain

Removing the drain is a simple procedure. Once the tube has been removed, the wound may need a stitch. The stitch will need to be removed after 5 to 7 days. This can usually be done at your GP practice or by a district nurse.

Any questions?

If you have any further questions please do not hesitate to ask your doctor or nurse on the ward.

Previous reference: RES025-1011

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APPENDIX 1 - CLINICAL PATHWAYS/DECISION TREES

Pneumothorax Pathway



* Talc pleurodesis can be considered on the first episode of pneumothorax in high risk patients in whom repeat pneumothorax would be hazardous (eg, severe COPD).

CXR, chest X-ray; COPD, chronic obstructive pulmonary disease; OPD, outpatient department; PSP, primary spontaneous pneumothorax; SSP, secondary spontaneous pneumothorax.

BTS Guideline

Unilateral pleural effusion diagnostic pathway



CXR, chest X-ray; FBC, full blood count; LDH, lactate dehydrogenase; NT-proBNP, N-terminal prohormone brain natriuretic peptide; PE, pulmonary embolism; TB, tuberculosis; TUS, thoracic ultrasound.

Amyloid

- Congo red staining

BTS Guideline



* Assuming ultrasound demonstrates safe volume of accessible pleural fluid.

[†] As evidenced by ongoing temperature, persisting elevation of inflammatory markers. Those with septations and pleural pH >7.4 should also be considered for drainage.

Initial pH	Level of risk for CPPE / pleural infection	Initial action regarding drainage
≤ 7.2	High risk	Insert ICD, assuming ultrasound demonstrates safe volume of accessible pleural fluid
> 7.2 to < 7.4	Intermediate risk	 Check LDH and review other parameters which may support CPPE / pleural infection. Consider ICD insertion if LDH > 900, especially if any of the following: Large pleural fluid volume Low pleural fluid glucose (72 mg/dL / ≤ 4.0 mmol/L) Pleural contrast enhancement on CT Septation on ultrasound
≥ 7.4	Very low risk	No indication for immediate ICD

CPPE, complex parapneumonic effusion; LDH, lactate dehydrogenase; ICD, intercostal drain.



Intrapleural treatment may be considered prior to surgical treatment in liaison with surgical expertise.

ICD, intercostal drain; TPA, tissue plasminogen activator; VATS, video-assisted thoracoscopy surgery.

BTS Guideline



IPC, indwelling pleural catheter.

CONSENT			CONSENT		
PLEURAL PROCEDURES:	Pleural Aspiration		PLEURAL PROCEDURES:	Pleural Aspiratio	
Diagnostic / Therapeutic Pleural Aspiration Cor	isent		Diagnostic / Therapeutic Pleural Aspiration Conse	ent	
Procedure: (delete as appropriate)			Procedure: (delete as appropriate)		
Diagnostic pleural aspiration			Diagnostic pleural aspiration		
Therapeutic pleural aspiration			Therapeutic pleural aspiration		
Explanation:			Explanation:		
I have explained the procedure to the patient and in particular I have explained:			I have explained the procedure to the patient and in particular I have explained:		
Intended benefits (delete as appropriate)			Intended benefits (delete as appropriate)		
 Obtain sample of pleural fluid to aid further diagnos Relieve breathlessness by removal of air or fluid from the pleural space 	is 1	۲	 Obtain sample of pleural fluid to aid further diagnosis Relieve breathlessness by removal of air or fluid from the pleural space 		
Serious or frequently occurring risks:			Serious or frequently occurring risks:		
 Pneumothorax – air leak causing collapsed lung 			- Pneumothorax – air leak causing collapsed lung		
- Failure of procedure			- Failure of procedure		
- Pain			- Pain		
 Bleeding Injury to major organs e.g. liver, heart, spleen. 			 Bleeding Injury to major organs e.g. liver, heart, spleen. 		
Patient information leaflet provided	MA		Patient information leaflet provided		
Procedure will involve:	E SE		Procedure will involve:		
- Local anaesthesia			- Local anaesthesia	E Contraction	
iticker to be placed on consent form			Sticker to be placed on consent form	(Ryanna)121145398/	

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(Ryanna)RespiratoryConsent_12114539.indd 1

Appendix 16 **Pleural Procedures Policy**

CONSENT

PLEURAL PROCEDURES:

Intercostal chest drain

Intercostal Chest Drain Consent

Procedure: (delete as appropriate)

Seldinger Chest drain Wide bore chest drain Pleurodesis Tunnelled chest drain

Explanation:

I have explained the procedure to the patient and in particular I have explained:

Intended benefits (delete as appropriate) Relief of symptoms by drainage of:

- Air
- Fluid

Serious or frequently occurring risks:

- Pain
- Bleeding

- Infection

- Drain falls out or becomes blocked
- Failure of the procedure
- Air leak to the skin (surgical emphysema)

- Injury to major organs e.g. liver, heart, spleen.

Patient information leaflet provided

Procedure will involve:

- Local anaesthesia

- Sedation

Sticker to be placed on consent form

(Ryanna)12114539SJ

Tenno

CONSENT						
PLEURAL PROCEDURES:	Intercost	al chest drain				
Intercostal Chest Drain Consent						
Procedure: (delete as appropriate)						
Seldinger Chest drain	Pleurodesis					
Wide bore chest drain	Tunnelled chest drain					
Explanation:						
I have explained the procedure to the patient and in particular I have explained:						
Intended benefits (delete as appropriate)						
Relief of symptoms by drainage of:						
- Air						
- Fluid						
Serious or frequently occurring risks:						
- Pain						
- Bleeding						
- Infection						
 Drain falls out or becomes blocked 						

- Failure of the procedure
- Air leak to the skin (surgical emphysema)
- Injury to major organs e.g. liver, heart, spleen.

Patient information leaflet provided

Procedure will involve:

- Local anaesthesia

- Sedation

Sticker to be placed on consent form

(Ryanna)12114539SJ