Paediatric Intensive Care Unit

Chest Drains in PICU, CICU & East Midlands Congenital Heart Centre.

Staff relevant to: Medical and Nursing staff caring for children in the PICU

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Written by: Adrian Low, Claire Westrope
Reviewed by: Claire Westrope & Lauren Maughan

Trust Ref: C41/2016

Related Guidelines and Policies:

<table>
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<tr>
<td>C62/2019</td>
<td>Chest Drain Management UHL Childrens Hospital Guideline</td>
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<td>C11/2012</td>
<td>Chest Drain Insertion UHL Neonatal Guideline</td>
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<td>C127/2016</td>
<td>Empyema UHL Childrens Medical Guideline</td>
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<td>Mobilisation with Drains and Lines UHL Childrens Intensive Care Guideline</td>
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1. Indications

This guidance can be used as an aid and learning tool by medical, nursing and allied health professional staff involved in the insertion of a chest drain, care of the chest drain, and safe removal of a chest drain inserted into a paediatric patient within PICU, CICU & East Midlands Congenital Heart Centre.

2. Precautions/Considerations

In paediatric patients with a chest drain, a chest drain will be inserted as an invasive procedure to:

- Remove the fluid or air from the pleural space or mediastinum
- Re-expand the lungs and restore normal negative intra-pleural pressure and respiratory function.

Conditions requiring a chest drain insertion include:

- pneumothorax
- haemothorax
- hydrothorax- pleural effusion
- chylothorax
- empyema
- post-operative cardiac or thoracic surgery

The National Patient Safety Agency recently raised concerns about the reported risks associated with chest drain insertion. NPSA reported 12 deaths relating to chest drain insertion and 15 cases of serious harm between January 2005 and March 2008.

The Medicines and Healthcare Products Regulatory Agency (MHRA) reported nine incidents between 2003 and 2008, all but one relating to the use of Seldinger type drains. Common themes from a review of incidents reported to the NPSA, MHRA, local investigations and literature included lack of supervision of junior doctors, the level of experience of clinicians inserting chest drains, inadequate imaging and lack of knowledge of existing clinical guidelines.
Chest drain insertion flowchart

- Chest drain indicated?
  - Pneumothorax
  - Haemothorax
  - Pleural effusion
  - Chylothorax
  - Emphyema
  - When draining fluid ultrasound should be used - use a skin marking pencil if necessary

- On heparin?
  - Stop heparin 4 hours before procedure after review with consultant & surgeon

- Coagulopathy (INR >2) or Platelets less than 50x10⁹/L
  - Correct coagulopathy or platelet deficiency

- Post-cardiac/ pneumonectomy/ lobectomy
  - Consult surgical team

- If emergency, consider high bleeding risk

Fill in LocSS/Ip – consent obtained?

Prepare patient for chest drain insertion

Insert drain (Seldinger or blunt dissection). Consider ultrasound guidance

Secure drain (2 points: insertion point & Grilock/ omental tape)

Connect to unidirectional flow drainage (kept below patient level)

Chest X-ray + analgesia

Consider clamping drain for 1 hour once 10ml/kg fluid removed

Mobilisation allowed if non-bubbling chest drain after discussion with consultant (do not clamp when mobilising)

Drain sizing guide
- Newborn: 8-12 FG
- Infant 12-16 FG
- Child 16-24 FG
- Adolescent 20-32 FG

Equipment needed
- Sterile gloves, gown, mask & drapes.
- Skin antiseptic solution
- Gauze swabs
- Syringes and needles (21–25 gauge)
- Lignocaine 1% or 2%
- Scalpel and sutures
- Instrument for blunt dissection/ cut down set
- Chest tube / Seldinger chest drain set
- Connecting tubing
- Closed drainage system (including water)
- Dressing
Chest drain removal flowchart

**Chest drain removal flowchart**

**Rough orientation:**

<table>
<thead>
<tr>
<th>Weight</th>
<th>Drainage Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15kg</td>
<td>&lt; 0.6 ml/kg/h over past 6 hours</td>
</tr>
<tr>
<td>&gt;15kg</td>
<td>&lt; 10 ml/h over past 6 hours</td>
</tr>
</tbody>
</table>

- **Review for residual pleural fluid:** (Pleural ultrasound check or chest X-ray)
- **Mobilise patient if not contraindicated**
- **Review with surgeons**
- **APTT > 80**
  - **Discuss with consultant**
  - **Pacing wires in situ?**
    - **Consider removing pacing wires first**
    - **Ensure adequate analgesia**
  - **Clamp all drains**
  - **> 1 drain present?**
    - **Remove drain while on suction**
    - **Chest X-ray**

**Heparin hold is not usually required prior to removal**

**Chest drain removal**

1. Count 3 breaths from patient
2. On 3rd inspiration (lungs fully inflated)
3. The **same nurse/medic who is applying pressure pulls the drain with a free unrestricted motion**
4. As it exits the wound site (felt by the fingertips), apply pressure with the fingertips to seal the wound.
Section 1: Chest Drain Insertion Technique

Pre-drainage assessment

- The person inserting the chest drain is personally responsible for carrying out all the pre-insertion checks though supervision should still be given as appropriate.
- Complete LocSSIP
- Assess risks/benefits of inserting a drain out of hours,
- Review patients obs/EWS
- Review up to date chest imaging and confirm side of abnormality
- Review allergies and medications (anti-platelet and anti-coagulation therapy)
- Consent (informed or implied)
- Where possible, any coagulopathy or platelet defect should be corrected prior to chest drain insertion. Platelet levels of at least 50x10^9/L are acceptable as per the current UHL Blood Transfusion guideline.
- The differential diagnosis between a pneumothorax and bullous disease requires careful radiological assessment.
- Lung densely adherent to the chest wall throughout the hemithorax is an absolute contraindication to chest drain insertion.
- The drainage of a post pneumonectomy/ lobectomy space or space following congenital diaphragmatic hernia repair should only be carried out by or after consultation with surgeon/surgical team.
- On Warfarin: Drains should not be inserted with an INR higher than 2 (if emergency, consider high bleeding risk). Consider switching warfarin to heparin.

Equipment

- Sterile gloves, gown and facemask.
- Skin antiseptic solution, e.g. iodine or chlorhexidine in alcohol
- Sterile drapes
- Gauze swabs
- A selection of syringes and needles (21–25 gauge)
- Local anaesthetic, e.g. lignocaine (lidocaine) 1% or 2%
- Scalpel and blade
- Suture
- Instrument for blunt dissection/ cut down set
- Chest tube / Seldinger chest drain set
  - Newborn: 8-12 FG
  - Infant 12-16FG
  - Child 16-24FG
  - Adolescent 20-32FG
- Connecting tubing
- Closed drainage system (including sterile water if underwater seal being used)
- Dressing

Patient Position and Insertion site

The preferred position for drain insertion is on the bed, slightly rotated, with the arm on the side of the lesion behind the patient’s head to expose the axillary area. Insertion should be in the “safe triangle” illustrated in figure below. This is the triangle bordered by the anterior border of the latissimus dorsi, the lateral border of the pectoralis major muscle, a line superior to the horizontal level of the nipple and an apex below the axilla. Drains are usually placed in the 4th or 5th intercostal space just anterior to the mid-axillary line – roughly level with the nipple or the lower border of the scapula.
In emergency situations the second intercostal space in the midclavicular line is accessed but, due to cosmetic reasons, a more permanent drain is placed in the usual position. When draining fluid an ultrasound should be used to guide thoracocentesis or drain placement - use a skin marking pencil if necessary.

Aseptic Technique
An aseptic technique should be used for insertion of the chest drain.

Insertion of Chest Drain
Insertion of a chest tube should never be performed with any substantial force since this risks sudden chest penetration and damage to essential intrathoracic structures. This can be avoided either by the use of a Seldinger technique or by blunt dissection through the chest wall and into the pleural space before catheter insertion.

The approach depends on the experience of the user though blunt dissection is preferred for insertion of bigger drains. The Seldinger technique results in less discomfort and scarring for the patient as well as there being a better seal around the drain.

Seldinger technique

The Leicester NICU chest drain insertion guidelines have a very useful pictorial guide on the Seldinger technique. Link: Chest Drain Insertion UHL Neonatal Guideline C11/2012
Small bore chest tubes are usually inserted with the aid of a guidewire by a Seldinger technique. Blunt dissection is unnecessary as dilators are used in the insertion process.

Identify surface landmarks and infiltrate insertion site and deeper tissues with local anaesthesia.

Use a Seldinger needle and syringe to localise the position for insertion by the identification of air or pleural fluid.

Insert the needle over the top of the lower rib in the space at approximately a 60–90° angle.

Create a small amount of negative pressure with the syringe as the needle is advanced. Advance the needle until a ‘pop’ is felt. This will indicate pleural penetration. Air flows into the syringe when the pleural space is entered.

Disconnect the syringe and pass a guidewire through the hub of the needle.

Remove the needle, keeping the guidewire in place and make a tiny incision in the skin to accommodate the dilator. Pass a dilator over the guidewire into the pleural space. The entire dilator does not enter the pleural space.

A small bore tube can then be passed into the thoracic cavity along the wire after removing the dilator.

Remove the guidewire after an adequate amount of chest drain has been inserted. **DISCONNECT THE PATIENT FROM THE VENTILATOR (if applicable) DURING INSERTION OF CHEST TUBE TO PREVENT LUNG PENETRATION.**

*This procedure has been successfully used for pneumothorax, effusions, or loculated empyemas*

**Blunt dissection**

Once the anaesthetic has taken effect an incision is made. The incision should be made just above and parallel to a rib. The incision for insertion of the chest drain should be similar to the diameter of the tube being inserted.

*Many cases of damage to essential intrathoracic structures have been described following the use of trocars to insert large bore chest tubes. '....If a trocar comes with a chest drain it should be discarded or only used to hold up tomato plants....'*

Blunt dissection of the subcutaneous tissue and muscle into the pleural cavity has therefore become universal and is essential.

- Using a Spencer-Wells clamp or similar, make a path through the chest wall by opening the clamp to separate the muscle fibres. For a large chest drain similar in size to the finger, this track should be explored with a finger through into the thoracic cavity. The creation of a patent track into the pleural cavity ensures that excessive force is not needed during drain insertion and ensures safety of underlying structures.
- After dissecting down to the pleura, hold the forceps near the tip to control its entry into the pleura.
- Pierce the pleura by pushing the forceps over the lower rib and through the pleura using a twisting motion. A ‘pop’ is felt as the pleura is breached.
- Maintain the forceps in place and return the grip to the handle. Use the forceps to enlarge the pleurotomy.

**DISCONNECT THE PATIENT FROM THE VENTILATOR.** Remove the forceps and insert the drain preferably angled anteriorly to drain air, posteriorly to drain fluid.
Position of tube tip

- The position of the tip of the chest tube should ideally be aimed apically for a pneumothorax or basally for fluid. However, any tube position can be effective at draining air or fluid and an effectively functioning drain should not be repositioned solely because of its radiographic position.
Securing the drain

Two sutures are usually inserted—the first to assist later closure of the wound after drain removal and the second, a stay suture, to secure the drain (see illustration below).

A transparent dressing allows the wound site to be inspected by nursing staff for leakage or infection. An omental tag of tape (as shown in the picture above) allows the tube to lie a little away from the chest wall to prevent tube kinking and tension at the insertion site.

After Care

- Continual observation for the first 15 minutes following CD insertion and then Obs every 15 minutes for the 1st hour so that Re-expansion pulmonary oedema can be identified
- Ensure adequate pain relief
- A chest radiograph should be performed after insertion of a chest drain.
- All chest tubes should be connected to a unidirectional flow drainage system (such as an underwater seal bottle) which must be kept below the level of the patient’s chest at all times
• Appropriately trained nursing staff must supervise the use of chest drain suction
• Clear guidance on drainage limit - Avoid draining too much fluid too quickly. In cases of massive effusion or empyemas consider clamping the drain for 1 hour once 10 ml/kg are initially removed to prevent cardiovascular instability.
• Consider adult limits in older children and adolescents - current BTS guidance says no more than 1500mls in the 1st hour, and no more than 1000ml for smaller adults
• Plan for controlled pleural drainage (with a 3-way tap for Seldinger drains) - Stop drainage by turning the 3-way tap if any of the following red flags show:
  • Chest pain or discomfort on drainage
  • Persistent cough or worsening breathlessness or vagal symptoms on drainage
  • Deteriorating observations
  • When 1500mls removed (or other appropriate amount), reopen 3-way tap after 1 hour and allow no more than 5ml/kg or 500mls to be removed per hour
• Free drainage when drainage less than 5ml/kg/h or 500mls/h.

• POST-OPERATIVE SURGICAL PATIENTS ARE NOT INCLUDED IN THIS CATEGORY.
• A bubbling chest drain should never be clamped
• Escalate any serious complications urgently to senior decision maker

Documentation

• Pre-procedure documentation must include LocSSIP and consent
• Procedure must be recorded in medical notes by the practitioner and said practitioner must provide clear verbal and written instructions to nursing staff regarding fluid drainage management
• Post procedure documentation must include specific suction requirements

Section 2: Chest Drain Care

In this section we provide guidance for nurses undertaking the care of a child with a chest drain. This includes student nurses who have been assessed by their mentor as competent to carry out this task and performing this procedure under the supervision of a registered children’s nurse

This guidance needs to be performed in conjunction with relevant infection control and consent policies to ensure the child receives safe care and children and families are able to understand the reasons for care to facilitate co-operation

Resources required:
Closed under water seal drainage system 2 chest tube clamps
Sterile dressing for drain insertion site if oozing fluid
Tape to secure tubing to patient’s side (particularly on mobilising)
Low pressure wall suction (as directed by medical staff)
Fluid balance/Chest drainage chart

The table below describes procedure/process for chest drain care
## Procedure / Process for Chest Drain Care

<table>
<thead>
<tr>
<th>No</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>At least two chest drain clamps must accompany the child at all times. Ensure bed space is free tidy and access to emergency equipment is available at all times. If low suction is required (this should be documented by medical staff) then ensure high suction is also available at the beds pace. Regular checks should be made to ensure suction is maintained at the correct level (usually 3-5kpa)</td>
</tr>
<tr>
<td>2</td>
<td>Ensure child / young person is in a comfortable lying or sitting position prior to manipulation of the tubing or bottle. Always keep the level of the drain below patient’s chest height. (if this is not possible refer to section below on chest drain clamping.)Record drainage hourly on fluid balance /chest drainage chart. Lift redundant loops of drain prior to recording. Change drainage bottles daily when full or every 3 days.</td>
</tr>
<tr>
<td>3</td>
<td>Immediately following insertion of drain, perform ¼ - hourly recording of drainage (noting type and amount). Reduce these recordings to hourly as drainage amount indicates.</td>
</tr>
</tbody>
</table>
| 4  | Ongoing observations for duration of chest drain: Chest drain site:  
- Skin condition  
- Signs of infection  
- Signs of fluid leakage  
- Audible air leak  
Four hourly recordings of the following vital signs.  
- Temperature  
- Heart rate & blood pressure  
- Respiration rate  
- Oxygen saturations |
| 5  | Ensure child receives appropriate pain assessment and analgesia as needed to minimise pain of having drain in situ |
| 6  | **If a drain needs to be raised above the patient’s chest then two clamps should be used on the drain (not the drainage tubing) to prevent drain bottle contents siphoning into the chest.**  
Chest drains do not routinely need to be clamped for transfer or movement of the patient. **Clamps should not be left on for long periods of time.**  
If a patient has a continuous air leak (drain is bubbling all the time) it **must never be clamped.** |

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Title: Chest drains in PICU, CICU & EMCHC  
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Trust Ref No: C41/2016  
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Next Review: October 2024
### Mobilising/moving patients with chest drains

- Before mobilising/moving a patient check whether the chest drains are securely anchored to the patient's abdomen/side of the chest to reduce risk of traction and discomfort.
- Pigtail drains require securing at 2 points at the minimum – at the insertion point and to the patient's abdomen (or side of the chest) with an omental tape or GripLock.
- Incorrectly secured drains which are in risk of dislodgement must be reviewed and re-secured before the patient is mobilised.
- Administer adequate pain management to achieve mobilisation, coughing and deep inspiration.
- Do not clamp the chest drain during mobilisation, ensure the drain bottle remains below the level of the chest.
- Patients with a non-bubbling chest drain may be allowed to go off the ward with/or without nursing supervision, at the discretion of the primary team consultant. This decision should be recorded in the clinical record.

### Section 3: Chest Drain Removal

The indications for removing chest drains include:

- Lung re-expansion on chest x-ray.
- No evidence of air leak for 24 hours.
- Fluctuations in water seal chamber stop.
- Drainage diminishes to little or nothing.
- Comfortable respiratory effort.
- Normal breath sounds over both lungs on auscultation.

The drain may require milking to prevent clots of fibrin blocking the tube. Mediastinal drains, which are inserted following cardiac or thoracic surgery will need ‘milking’ to maintain patency as long as they continue to drain. Pleural drains that have been in situ for more than a few days may need milking.

To milk a drain concertina the tubing (not the drain) in your hand and squeeze. It may take a few squeezes to move any fibrin. **Do not strip** chest drains routinely. Stripping of chest drains with clamps or rollers can cause lung damage. However, some drains may need stripping and this should only be done after a direct request from the consultant surgeon.

When a specimen of pleural fluid is requested, this needs to be taken from the tubing not the drainage bottle.

If fluid replacement therapy is required this needs to be prescribed and documented on the child’s fluid balance chart.
Prior to removal of chest drain ensure that drain losses are minimal and that the medical and surgical teams have requested and agreed for removal of chest drains.

**Important points prior to chest drain removal post cardiac surgery**

<table>
<thead>
<tr>
<th>Presence of residual pleural fluid (pleural ultrasound check or chest Xray)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical review</td>
</tr>
<tr>
<td>APTT &lt;80 (if higher discuss with consultant)</td>
</tr>
<tr>
<td>Drains can be removed safely as long as the INR is less than 4</td>
</tr>
<tr>
<td>Adequate analgesia</td>
</tr>
<tr>
<td>Pacing wires removed (usually)</td>
</tr>
<tr>
<td>Drain volumes (&lt; 15kg: &lt; 0.6ml/kg/h over past 6 hours; &gt;15kg: &gt; 10ml/h over past 6 hours)</td>
</tr>
</tbody>
</table>

*Heparin hold is not required pre- chest drain removal*

**Analgesia**

Removal of chest drains is a painful procedure and the patient will usually require analgesia. Consider IV Morphine bolus 5-15mins prior to procedure or Oromorph thirty minutes before. (Refer to the latest BNF for children for dosage). Distraction therapy by an appropriate by a member of staff may be useful.

In PICU/CICU they may also require conscious sedation (PICU consultant decision, patient will need to be NBM – follow Pre-Anaesthesia Fasting Recommendations UHL Paediatric Intensive Care Guideline (C47/2021)

**Procedure**

Chest drains to be removed by two nursing/medical staff. The patient will require at least continuous ECG and oxygen saturations monitoring throughout until post procedure CXR has been reviewed. Personal protective equipment including goggles must be worn as per hospital policy, and a strict aseptic non-touch technique must be applied during the procedure.

If more than one is drain is present, isolate the drain being removed. Continue with suction, if it is being applied, during the removal procedure.

Ensure there is a usable mattress/purse string suture to seal the wound site and free the ends of the purse string suture with a safe sharp stitch cutter. If there is no usable purse string suture available, inform the intensivist or surgical team who will make a decision on whether a purse string suture is necessary (occasionally a steri strip may be adequate).

Free the fixing/stay suture from the skin with a safe sharp stitch cutter and with a gloved fore finger place the tip of the finger in line with the top of the wound site.
Figure 1: Photo illustrates chest drain with ‘stay/holding’ suture and ‘mattress/closing’ suture

Count three breaths from patient and on the third inspiration when the lung reaches full inflation (ventilated or non-ventilated), the same nurse/medic who is applying pressure with the gloved finger pulls the drain with a free unrestricted motion. As it exits the wound site (felt by the finger tip) apply pressure with the fingertip to seal the wound.

- In ventilated patient aim to remove the drain during inspiration (positive pressure should force any air out)
- In spontaneously breathing and cooperative child – take a deep breath in and hold – then remove drain (natural tendency is to take a sharp breath in when the drain is manipulated – this is not possible if the patient is already at the end of inspiration)
- Crying child – the intrathoracic pressure is elevated – this is good time to remove the drain.

The two free ends of the purse string suture are raised with tension by the 2nd member of staff to ensure the wound is sealed and then tied under tension with at least 5 knots. The site is then inspected for any leaks and is cleaned with 0.9% saline on sterile gauze. The site is dried and protected with a padded softpore dressing. The same routine will continue until the requisite number of drains are removed.

Disposal of the chest drain and the tubing is facilitated by double bagging with the orange waste bags.

A post drain removal chest x-ray must be performed and reviewed within one hour. In the event of sudden patient deterioration post chest drain removal, request urgent CXR, senior help and consider needle thoracocentesis (risk of pneumothorax).

Continue regular observation of vital signs for at least four hours post drain removal. Skin suture needs to be removed after seven days. If patient is discharged prior to this, ensure it is documented in the discharge plan.
3. Education and Training

Training and raising awareness are on-going processes. On-going awareness is promoted through the induction and continuous bedside teaching. Training is provided for medical staff during lunchtime teaching (Wednesdays) and other sessions, and at junior doctors’ induction training. Nursing education is supported by the Practice Development teams, and nursing educators.

4. Monitoring Compliance

<table>
<thead>
<tr>
<th>What will be measured to monitor compliance</th>
<th>How will compliance be monitored</th>
<th>Monitoring Lead</th>
<th>Frequency</th>
<th>Reporting arrangements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest drains complications</td>
<td>Audit, datix</td>
<td>Consultant intensivist</td>
<td>ongoing</td>
<td>CPM/risk</td>
</tr>
</tbody>
</table>

5. Supporting References

6. Practical Paediatric Procedures Henderson,Nichani
8. Chest Drain Insertion Guideline for Paediatric ICU. *Birmingham Children’s Hospital Guidelines* April 2009
9. UHL Blood Transfusion Policy 2004


22. The Royal Children's Hospital’s chest drain guidelines

23. Percutaneous insertion of a chest tube using the Seldinger technique. Thal-


### 6. Keywords

PICU/CICU, Insertion, Chest drain, Pneumothorax, Seldinger technique, Blunt dissection, Haemothorax, Pleural effusion, Chylothorax, Empyema, Post-operative cardiac or thoracic surgery

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.

As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

<table>
<thead>
<tr>
<th>Contact and review details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guideline Lead (Name and Title)</td>
</tr>
<tr>
<td>Claire Westrope - Consultant PICU/ECMO</td>
</tr>
</tbody>
</table>

**REVIEW RECORD**

Description Of Changes (If Any); November 2021
Ref to NICU chest drain insertion guidelines added
LocSSIP added
Flowcharts added
Pictorial guides added
Added considerations to pre-drainage assessment, risks/benefits, EWS, imaging, medications and warfarin.
After care - immediate observations frequency added
Considerations/parameter/clinical indicators for drainage limits added
Added section on mobilising and reference to mobilisation guideline
Added post cardiac surgery drain removal considerations
Title: Chest drains in PICU, CICU & EMCHC
V: 3 Approved by: PICU clinical practice group, UHL safer surgery committee & UHL Pleural procedures committee; October 2021
Next Review: October 2024

Trust Ref No: C41/2016

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Appendix 1: LocSSIP

Invasive Procedure Safety Checklist: Intercostal Pleural Drain Checklist

1. BEFORE THE PROCEDURE
   - Confirm identity: YES / NO
   - Have all the team introduced themselves and role: YES / NO
   - Indication: Air / Fluid / Both
   - Radiology reviewed: YES / NO / PA
   - Confirmed side of procedure: Left / Right
   - Observation: BP, SpO2, HR
   - Patients coagulation and medication checked: YES / NO
   - Consent: Written / Verbal /パパ
   - Thorax US for Fluid Done: YES / NO / NR
   - Thorax US findings: Echoic / Anephic
   - Effusion depth (cm) / Other findings:

2. PROCEDURAL CHECKLIST AND REPORT
   - Aseptic Technique: Sterile / Non Sterile
   - At least two applications of chlorprop: YES / NO
   - STOP if unable to aspirate: Air OR Fluid with local anaesthetic
   - Site: Left / Right / Site:
   - Upright anesthetic: 1% / 2% / Dose:
   - Fluid appearance:
     - Samples: N.B.: Quantity / Microbiology
     - Drain Size: Secured / Free
     - Purse String: YES / NO / NR
   - Complications: Pain (0-10)
   - Other:
     - Guide wire removed: YES / NO / NR
     - If yes – please document below:

3. POST PROCEDURAL CHECKLIST
   - Check chest drain insertion on PACU.
   - Operations protocol and handover for review:
     - Record chest drain loss on appropriate chart: YES / NO
     - Post-take analysis: YES
     - Ensure specimen correctly labelled: YES / NO / NR
     - Observation: BP, SpO2, HR:
       - Confirm instructions on fluid drainage
         - Low flow suction required?: YES / NO / NR (check rate)

   - Confirm frequency of observations, every 15 minutes for 1 hour, then hourly thereafter:
   - Are there procedural problems that need follow up?: YES / NO

Operator inserting drain: Grade:
Signature: Date: / / Supervised: YES / NO / Assistant: YES / NO / NR
Name: Grade:
Signature: