

## **Good Practice Standards for Controlled Removal of Fluid from Chest Drains (Adults)**

### ***Background***

Pleural effusions cause breathlessness due to accumulation of fluid between the lung and chest wall. Pleural effusions are a common medical problem with more than 50 recognised causes, and treatments vary accordingly. Large pleural effusions, such as those caused by pleural malignancy and pleural infection, may require the insertion of a chest drain and controlled fluid drainage to enable lung re-inflation.

If large volumes of pleural fluid are released too quickly, especially in the first hour post insertion, patients are at risk of rapid deterioration due to a reduction in blood pressure and acute breathlessness associated with re-expansion pulmonary oedema (RPO). Mortality from RPO can be as high as 20% therefore this initial period requires very close nursing surveillance.

Any concerns or complications must always be reported to the medical team urgently and local escalation procedures followed.

Although this document was produced as part of a National Patient Safety Agency (NatPSA) alert for England, the safety aspects outlined in this good practice document are applicable to the management of adults presenting with pleural disease across the four nations.

All relevant incidents reviewed related to adult patients (aged 18 years and older) regardless of any protected characteristics and do not influence equality. A full equality impact assessment (EIA) will be undertaken for any new policy in line with best practice.

### ***Good Practice Points***

#### ***General***

- ✓ 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 blood clotting and where possible, any coagulopathy or platelet defect should be corrected
- ✓ Review allergies and medication (specifically antiplatelet, anticoagulation etc.)
- ✓ Ensure written consent has been obtained or act in best interests for 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 a post drain insertion chest x-ray (CXR) has been requested and reviewed
- ✓ Post procedure observations must be recorded, and any concerns escalated
- ✓ Ensure the patient is left comfortable and analgesia is prescribed
- ✓ 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
- ✓ Escalate any serious or life-threatening complications, such as RPO, or suspected vascular or visceral injury, urgently to a senior decision maker

### ***Documentation***

- ✓ Pre procedure and post procedure observations should be clearly recorded as per local hospital guidelines
- ✓ Pre-procedure documentation must include:
  - LocSSIP document
  - Written informed consent/ best interests
- ✓ The practitioner inserting the chest drain must document the procedure in the medical notes and provide clear written and verbal information to nursing staff of fluid drainage management
- ✓ Patient comfort, NEWS2 score and fluid drainage must be closely monitored and recorded on the post-procedure document for the first hour as this is the greatest risk period for the development of RPO
- ✓ Observations, taken every 15 min for the first hour is advised, so any deterioration in the patient's condition can be acted on quickly
- ✓ Post-procedure documentation must include:
  - Specific chest drain flushing instructions and any thoracic suction requirements as necessary.
  - Post-procedural observations and chest drain volume checks, which should occur
    - every 15 minutes in the first hour,
    - every hour for the next 3 hours
    - then 4 hourly until chest drain is removed

- Plan for controlled pleural drainage with the use of a 3-way tap for seldinger drains (not clamping) – see below.
- Clear guidance that no more than 1500mls of pleural fluid to be drained in the first hour (in selected cases, 1000ml drainage may be appropriate e.g. in smaller adults); then allow up to 500ml per hour to drain before returning to free drainage.
- Information on key red flags (see below) and local escalation procedures.
- See ARNS website [[Chest Drain Management Resources - ARNS](#)] for an example of a post-procedure document that fulfils these requirements.

### ***Controlled pleural drainage***

Preventative strategies to reduce the risk of deterioration and RPO include the use of a 3-way tap to facilitate controlled pleural drainage in order to limit initial drainage as described above.

- ✓ Ensure controlled pleural drainage by using a 3-way tap to open and close the drain.
- ✓ The recommended standard approach is for nursing or Allied Healthcare Professional (AHP) staff to stop drainage by closing the three way tap if the patient develops any of the key red flags/triggers below;
  - Chest pain or discomfort on drainage
  - Persistent cough, worsening breathlessness, or vagal symptoms on drainage
  - 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 500mls per hour is draining, leave on free drainage

### **Hyperlinks:**

1. British Thoracic Society (2010) [Investigation of a unilateral pleural effusion in adults: British Thoracic Society pleural disease guideline 2010 | Thorax \(bmj.com\)](#)
2. British Thoracic Society (2010) [Management of a malignant pleural effusion: British Thoracic Society pleural disease guideline 2010 | Thorax \(bmj.com\)](#)
3. British Thoracic Society (2005) [BTS guidelines for the management of pleural infection in children | Thorax \(bmj.com\)](#)
4. British Thoracic Society National Safety Standards for Invasive Procedures (NatSSIPs) Bronchoscopy and Pleural Procedures (2018) [National Safety Standards for Invasive Procedures - Bronchoscopy and Pleural Procedures | British Thoracic Society | Better lung health for all \(brit-thoracic.org.uk\)](#)
5. Royal Marsden 10<sup>th</sup> Ed. [Chest drain management - Royal Marsden Manual \(rmmonline.co.uk\)](#)
6. Re-expansive pulmonary oedema in paediatrics (2018) [pec50909 216..222 \(lww.com\)](#)
7. National Patient Safety Alert 'Deterioration due to rapid offload of pleural effusion fluid from chest drains' (2020) [NatPSA-Pleural-Effusion-FINAL-v3.pdf \(england.nhs.uk\)](#)
8. British Thoracic Society Guideline for pleural disease (2023) [British Thoracic Society Guideline for pleural disease | Thorax \(bmj.com\)](#)

**Date Issued:** 01.12.2020

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**Stakeholder Engagement:**

- Association of Respiratory Nurses
- Wendy Preston at the Royal College of Nursing
- Dr Nick Maskall at the British Thoracic Society
- National Patient Safety Response Advisory Panel [NHS England » Our National Patient Safety Alerts](#)

**Conflict of Interests:** None

**Note:** The Association of Respiratory Nurses and the British Thoracic Society require their members to declare an annual conflict of interest and update this if there are any change of circumstances.

**Review Date:** 02.08.2025

This document should be reviewed annually and relevant research and National updates must be considered prior to endorsement.