Patient Safety Alert

PSA012 / April 2021

GIG CYMRU NHS WALES

Llywodraeth Cymru
Welsh Government

Deterioration due to rapid offload of pleural effusion fluid from chest drains

To: All NHS Chief Executives, Medical Directors, Directors of Nursing and Patient Safety Teams

This alert is for action by: acute and specialist hospital services (for adults and children) and independent hospitals providing NHS funded services where chest drains may be inserted.

This is a safety critical and complex National Patient Safety Alert. Implementation should be co-ordinated by an executive lead (or equivalent role in organisations without executive boards) and supported by clinical leaders in respiratory medicine, thoracic surgery and oncology/clinical haematology.

Explanation of identified safety issue

Pleural effusions are the accumulation of fluid between the lung and chest wall, which may cause breathlessness, low oxygen saturation and can lead to collapsed lung(s). They are a common medical problem and have over 50 recognised causes[1] and various treatments. Large effusions, such as those caused by pleural malignancy, may require insertion of a chest drain and controlled drainage of fluid to allow the lung to inflate.

If large volumes of pleural fluid are drained too quickly, patients can rapidly deteriorate. Their blood pressure drops, and they can become increasingly breathless from the potentially life threatening complication of re-expansion pulmonary oedema[2] (RPO). This is due to a sudden re-expansion of the compressed lung with an accumulation of oedema within the lung(s). The rate at which fluid is drained must be controlled in order to prevent cardiovascular instability and collapse.

A review of the National Reporting and Learning System (NRLS) over a recent three-year period identified 16 incidents where patients experienced acute and significant deterioration after uncontrolled or unmonitored drainage of a pleural effusion; two of these patients died and a cardiac arrest call was made for one patient although the outcome was not reported.

Actions

When: Actions to be completed by 1 July 2021.

1. Review local chest drain clinical procedures/LocSSIP (or equivalent documents) to ensure they:
   a. Follow BTS guidelines for adults[2] and/or children[4] for controlled drainage of large pleural effusions.
   b. Include post-procedure management plans that align with BTS standards.[5]
   c. Incorporate the good practice points outlined in the ARNS Good Practice Standards[3] for adults. Note A
2. Provide a bedside observation chart or monitoring document[6] (electronic or paper) that embeds the key elements of the revised policy to ensure it includes:
   - clear instruction on frequency of observation; including continuous direct observation for first 15 minutes[3].
   - red flag triggers for drain closure.
   - local escalation procedure for patient deterioration before, during and after chest drain insertion.

Share any learning from local investigations or locally developed good practice resources by emailing: ImprovingPatientSafety@gov.wales

Incident reports suggested:

- staff did not expect large quantities of pleural fluid to drain
- observations and monitoring of patients after chest drain insertion were either not timely or not done
- plans to manage the rate of fluid drainage were not documented or not followed.

Insight from a sample of local policies indicates variation in practice for rate and volume of fluid drainage, frequency of observations and the use of clamps.

Good Practice Standards[3] for adults have been developed by the Association of Respiratory Nurse Specialists (ARNS) and the British Thoracic Society (BTS) to support consistent clinical procedures and reduce variability in practice.

Additional information

Note:

A. ARNS Good Practice Standards are for adult patients, however the broad principles apply to all ages.

B. Pleural aspiration and other pleural interventions should only be undertaken by professionals trained to perform the relevant procedure, who maintain their skills through regularly performing the procedure, and who are appropriately trained in thoracic ultrasound to ensure a safe procedure.

Patient safety incident data and literature

The NRLS was searched for incidents reported to have occurred on or after 8 May 2017 and uploaded to NRLS by 28 October 2020 using a combination of keywords (our reference PSI443). All incidents of moderate harm, severe harm and death were reviewed and samples of low and no harm incidents were reviewed.

In total, 16 incidents described harm to patients from unmonitored or uncontrolled rapid offload of pleural effusion fluid. Extrapolation from review of samples of incidents reported as no or low harm indicated that if these had all been reviewed around 15 additional incidents would have been identified.

Reports described patients with RPO, acute deterioration, haemodynamic compromise including critically low blood pressure, increased oxygen demand or collapse. One described the death of patient shortly after they were found collapsed with their chest drain overflowing, and another described the death of a patient after an unmonitored open chest drain

- The professional who inserts the drain must be supported by a nurse/HCSW to allow appropriate patient monitoring.
- Once the three way tap has been opened, the drain and under water seal must be under continuous direct observation for the first 15 minutes.

drained 5 litres of fluid. One incident described the need to call the crash team but did not specify the outcome. Other reported consequences were unconsciousness, delirium, profound hypotension, significantly reduced oxygen saturations, increased breathlessness, tachycardia, chest pain and distress.

All relevant incidents related to adult patients older than 18 years. RPO as a result of pleural effusion drainage can affect children but is extremely rare.[7]

References and resources

1. British Thoracic Society. Pleural disease guideline 2010: investigation of a unilateral pleural effusion in adults. www.thorax.bmj.com/content/65/Suppl_2/ii4
2. British Thoracic Society. Pleural disease guideline 2010: management of a malignant pleural effusion. www.thorax.bmj.com/content/65/Suppl_2/ii32
3. ARNS Good practice standards for controlled removal of fluid from chest drains (Adults) 2020 www.arns.co.uk/wp-content/uploads/2020/11/Good-Practice-Standards-Rapid-Offload.pdf
4. British Thoracic Society – Guidelines for the management of pleural infection in children 2005. www.thorax.bmj.com/content/60/suppl_1/i1
5 British Thoracic Society – National safety standards for invasive procedures: bronchoscopy and pleural procedures.2018 www.brit-thoracic.org.uk/quality-improvement/clinical-resources/interventional-procedures/national-safety-standards-for-invasive-procedures-bronchoscopy-and-pleural-procedures/
6. ARNS website: provides additional resources including an exemplar chest drain monitoring chart, patient information leaflet, and adapted WHO checklist for pleural procedures https://arns.co.uk/chest-drain-management-resources/
7. Hirsch AW, Nagler J. Reexpansion pulmonary edema in pediatrics. Pediatric Emergency Care 2018; 34 (3): 216-220. www.cme.lww.com/ovidfiles/00006565-201803000-00015.pdf
8. The Royal Marsden Manual of clinical nursing procedures 10th Ed, chapter on chest drain management; Wiley-Blackwell www.rmmonline.co.uk/manual/c12-sec-0114#c12-sec-0114

Stakeholder engagement

- Association of Respiratory Nurse Specialists
- British Thoracic Society
- Royal College of Nursing Respiratory Specialist Advisor
- National Patient Safety Response Advisory Panel (for a list of members and organisations represented on the panel, see www.england.nhs.uk/patient-safety/patient-safety-alerts/)

This Patient Safety Alert was originally developed and issued in England by NHS Improvement and has been replicated and adapted for Wales with kind permission from the NHS Improvement patient safety team under the Open Government Licence v3.0.