Pneumothorax - Neonatal Clinical Guideline

V2.0

June 2020
Summary

See flow chart on page 5
1. **Aim/Purpose of this Guideline**

1.1. This guideline is for the use of medical and nursing staff in the Neonatal Unit caring for newborns that develop a Pneumothorax.

1.2. This version supersedes any previous versions of this document.

1.3. **Data Protection Act 2018 (General Data Protection Regulation – GDPR) Legislation**

The Trust has a duty under the DPA18 to ensure that there is a valid legal basis to process personal and sensitive data. The legal basis for processing must be identified and documented before the processing begins. In many cases we may need consent; this must be explicit, informed and documented. We can’t rely on Opt out, it must be Opt in.

DPA18 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the DPA18 please see the ‘information use framework policy’, or contact the Information Governance Team [rch-tr.infogov@nhs.net](mailto:rch-tr.infogov@nhs.net)

2. **The Guidance**

2.1. **Background**

A pneumothorax is an air leak that develops between the visceral and parietal pleura following the rupture of an over distended alveolus. The incidence is 1-2% of live births. The incidence is higher in preterm infants who often have underlying respiratory distress syndrome. Surfactant administration reduces the risk of developing a pneumothorax in these infants. Other risk factors for pneumothorax include meconium aspiration syndrome, pneumonia, transient tachypnoea of the newborn, pulmonary hypoplasia and any form of respiratory support (Invasive and Non-Invasive). Pneumothoraces also develop spontaneously.

2.2. **Signs and Symptoms**

2.2.1. A pneumothorax should be suspected in any infant with an increasing oxygen requirement or sudden onset of respiratory distress.

2.2.2. There should be a high level of suspicion in any mechanically ventilated infant with an unexplained deterioration in oxygenation, ventilation or cardiovascular status.

2.2.3. Newborns with a small pneumothorax may be asymptomatic, however signs often accompanying a pneumothorax include:

- Tachypnoea
- Grunting
• Pallor
• A new or increasing oxygen requirement
• Increased respiratory effort
• Chest asymmetry with enlargement of the affected side
• Decreased breath sounds on the affected side

2.2.4. A large pneumothorax becomes an emergency when the air collection is under pressure, resulting in a tension pneumothorax. This results in collapse of the ipsilateral lung and shift of the mediastinum to the contralateral side, secondary to increased intrathoracic pressure.

2.3. Diagnosis

The diagnosis of a pneumothorax can be made with the aid of transillumination with a fiberoptic light. When the probe is placed on the chest, the affected hemithorax will light up. Transillumination is more difficult in larger babies, but with modern equipment may be possible. If the child is haemodynamically stable the diagnosis should be confirmed on Chest x-ray. In an unstable newborn the chest x-ray should be deferred and immediate evacuation of the pneumothorax should be performed (See Section 2.4 Management).

2.4. Management

See flow chart on next page
Pneumothorax in the Newborn

Minimise pressure support

VT/CPAP – Wean/stop
Ventilated – Reduce MAP
(by reducing PIP/PEEP/Ti)
Ensure expiratory time adequate to allow full expiration

Small
- Observe closely

Medium
- Observe closely

Large
- CVS stable
  - Insert chest drain promptly
  - Re X-Ray
  - Observe closely
- CVS unstable
  - Perform needle thoracocentesis
  - Insert chest drain
  - Re X-Ray
  - Observe closely

Tension Pneumothorax
- CVS stable
  - Insert chest drain
  - Re X-Ray
  - Observe closely

*Not all ventilated infants need chest drains inserted, especially those on a relatively low Mean Airway Pressure. Sometimes a needle thoracocentesis may be all that is necessary.*
2.5. **Procedure: Needle Aspiration of Chest**

*Needle aspiration is an emergency procedure only.* Care must be taken to avoid laceration of the lung or puncturing blood vessels.

2.5.1. **Equipment**

- 21 gauge (green) or 23 gauge (blue) butterfly needle – a cannula may cause less lung trauma
- 3 way tap
- 10 ml syringe
- Sterile gauze and Unisept sachet
- 1 pair sterile gloves

2.5.2. **Procedure**

- Infant supine, prepare area with alcohol wipes
- Insert needle into the pleural space (directly over the top of the rib in the 2nd or 3rd intercostal space in the mid-clavicular line) until air is aspirated into the syringe, then expel air through the 3-way stopcock

Images taken by RCHT ANNP Sarah Tabrett
2.6. **On-going Care**
Following needle aspiration insertion of an intercostal catheter is usually required for on-going management.

Insertion of Cook® Fuhrman Pigtail Pleural Drain using Seldinger Approach.
2.6.1. **Indications:** Pneumothorax or Pleural Effusion
We stock 2 types of Cook Fuhrman pigtail pleural drain sets

1) 8.5Fr/15cm - use for >1999gms
2) 6.0Fr/15cm - use for <1500gms

Both catheters have 6 side ports

2.6.2. **Advantages of Pigtail drains**
Less traumatic insertion and fewer complications Suitable for very preterm babies

2.6.3. **Disadvantages**
May Kink or obstruct due to its softer consistency

2.6.4. **Components of pleural drain pack**

1. 18 G introducer needle
2. J-wire guide (Length 40cm)
3. Dilator
4. Radiopaque pigtail catheter with 1cm markings (First marker at 7cm)
5. 3-way stopcock
6. Multipurpose tubing adapter

You will also need 5ml syringe, mosquito artery or similar forceps & a sterile procedure pack e.g. long line pack

2.6.5. **Preferred drain site:** 4th or 5th intercostal space, above a rib (to avoid injury to intercostal vessels which run under the rib) in the **mid axillary line**, well clear of the nipple.

Ensure adequate analgesia and sedation e.g. Morphine

2.6.6. **Prior to Procedure**

1. Mark the insertion site with a sterile permanent marker pen (with CFM equipment)
2. Glove and gown as per unit guideline for aseptic technique
3. Position the patient supine with procedure side tilted slightly upward
4. Prep the skin site as per unit guideline
5. Identify correct landmark
6. The use of a transparent sterile drape if available, enables continued visibility of landmark
7. Lignocaine 0.5%-1% local infiltration. Maximum 0.3mls/kg
8. Assemble needle & syringe and attach mosquito forceps 1-1.5cm distal to needle tip to reduce risk of inserting it too far into chest cavity.
2.6.7. **Procedure**

1. Slowly insert needle with attached forceps at 90 degree angle to the rib. Gently angle anteriorly for pneumothorax, aspirating until air is obtained or if draining a pleural effusion, aim posteriorly and aspirate until fluid is obtained.
2. Remove the syringe and advance soft J end of J-Wire, using its introducer through the needle to a length of 5cm into the chest (The J wire is very long, be aware of asepsis, 2 person technique advised).
3. Remove the needle gently and hold on to the J-wire where it exits the chest wall as soon as the needle tip is out. This is to avoid accidentally removing the J-wire.
4. Advance the dilator over the wire using a rotating action to pass through the chest wall. Then withdraw the dilator, again securing the J-wire to avoid inadvertently removing it.
5. Feed the pigtail catheter (coiled porthole end first) over the J-wire and advance into the chest cavity, up to the first black mark (7cm) for the extreme preterm babies & at the 2nd-4th mark for bigger babies based on measurement of targeted position.
6. Remove the J-wire
7. Use steri-strips to anchor pigtail to the skin.
8. Place transparent sterile dressing over insertion site.
9. Connect catheter to drainage unit using adapter and 3 way stopcock.
10. Dispose of sharps, clean equipment, document procedure
11. Request CXR to confirm position of catheter and document in notes.
3. Monitoring compliance and effectiveness
This part must provide information on the processes and methodology for monitoring compliance with, and effectiveness of, the policy using the table below.

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Key Changes to practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Dr Chris Bell, Neonatal Guidelines Lead</td>
</tr>
<tr>
<td>Tool</td>
<td>Adherence to guidelines will be monitored as part of the ongoing audit process on a WORD or Excel template</td>
</tr>
<tr>
<td>Frequency</td>
<td>As dictated by audit findings</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Child Health Directorate Audit and Neonatal clinical Guidelines Group</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Neonatal Business Meeting</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Required changes to practice will be identified and actioned within 3 months. A lead member of the team will be identified to take each change forward where appropriate. Lessons will be shared with all the relevant stakeholders</td>
</tr>
</tbody>
</table>

4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the 'Equality, Inclusion & Human Rights Policy' or the Equality and Diversity website.

4.2. Equality Impact Assessment
The Initial Equality Impact Assessment Screening Form is at Appendix 2.
## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Pneumothorax - Neonatal Clinical Guideline V2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>June 2020</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>June 2020</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>June 2023</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Sarah Tabrett (Advance Neonatal Nurse Practitioner), Hazel Greene (Paediatric Registrar)</td>
</tr>
<tr>
<td>Contact details:</td>
<td>(01872) 252667</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>This guideline is for the use of medical and nursing staff in the Neonatal Unit caring for newborns that develop a Pneumothorax.</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Neonatal. Neonate. Newborn. Pneumothorax. Chest drain</td>
</tr>
<tr>
<td><strong>Target Audience</strong></td>
<td>RCHT</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical Director</td>
</tr>
<tr>
<td>Date revised:</td>
<td>June 2020</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Pneumothorax - Neonatal Clinical Guideline V1.0</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Consultant approval. Child Health Directorate Audit. Neonatal Clinical Guidelines Group</td>
</tr>
<tr>
<td>Care Group General Manager confirming approval processes</td>
<td>Debra Shields</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>Not Required</td>
</tr>
<tr>
<td>Name and Signature of Care Group/Directorate Governance Lead confirming approval by specialty and care group management meetings</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Name: Caroline Amukusana</td>
<td></td>
</tr>
<tr>
<td>Signature of Executive Director giving approval</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Publication Location (refer to Policy on Policies – Approvals and Ratification):</td>
<td>Internet &amp; Intranet</td>
</tr>
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</table>
Pneumothorax - Neonatal Clinical Guideline V2.0

**Version Control Table**

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUGUST 2016</td>
<td>V1.0</td>
<td>Reviewed and approved at Neonatal Guidelines Meeting</td>
<td>Author: Sarah Tabrett. Advanced Neonatal Nurse Practitioner. Hazel Greene</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Paediatric Registrar Formatter: Kim Smith. Staff Nurse.</td>
</tr>
</tbody>
</table>

All or part of this document can be released under the Freedom of Information Act 2000

This document is to be retained for 10 years from the date of expiry. This document is only valid on the day of printing

Controlled Document

This document has been created following the Royal Cornwall Hospitals NHS Trust Policy for the Development and Management of Knowledge, Procedural and Web Documents (The Policy on Policies). It should not be altered in any way without the express permission of the author or their Line Manager.
Appendix 2. Initial Equality Impact Assessment

<table>
<thead>
<tr>
<th><strong>Section 1: Equality Impact Assessment Form</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name of the strategy / policy / proposal / service function to be assessed</strong></td>
<td></td>
</tr>
<tr>
<td>Pneumothorax – Neonatal Clinical Guideline V2.0</td>
<td></td>
</tr>
<tr>
<td><strong>Directorate and service area:</strong></td>
<td>Is this a new or existing Policy?</td>
</tr>
<tr>
<td>Child and Women’s Health. Neonatal</td>
<td>Existing</td>
</tr>
<tr>
<td><strong>Name of individual/group completing EIA</strong></td>
<td>Contact details:</td>
</tr>
<tr>
<td>Dr Chris Bell, Neonatal Guidelines Lead</td>
<td>(01872) 252667</td>
</tr>
</tbody>
</table>

1. **Policy Aim**
   Who is the strategy / policy / proposal / service function aimed at?
   - This guideline is aimed at clinical staff responsible for the management of neonatal infants suspected, or diagnosed with a pneumothorax.

2. **Policy Objectives**
   - As above

3. **Policy Intended Outcomes**
   - Safe and evidence based management of neonatal infants suspected, or diagnosed with a pneumothorax.

4. **How will you measure the outcome?**
   - See section 3

5. **Who is intended to benefit from the policy?**
   - Clinical staff
   - Patients

6a). **Who did you consult with?**

<table>
<thead>
<tr>
<th>Workforce</th>
<th>Patients</th>
<th>Local groups</th>
<th>External organisations</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b). Please list any groups who have been consulted about this procedure.
   - Please record specific names of groups:
     Consultant led Neonatal Guidelines meeting.

c). **What was the outcome of the consultation?**
   - Approved 12/06/2020
### 7. The Impact

Please complete the following table. If you are unsure/don’t know if there is a negative impact you need to repeat the consultation step.

Are there concerns that the policy **could** have a positive/negative impact on:

<table>
<thead>
<tr>
<th>Protected Characteristic</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sex (male, female non-binary, asexual etc.)</strong></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender reassignment</strong></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Race/ethnic communities /groups</strong></td>
<td></td>
<td>X</td>
<td></td>
<td>Any information provided should be in an accessible format for the parent/carer’s needs – i.e. available in different languages if required/access to an interpreter if required</td>
</tr>
<tr>
<td><strong>Disability (learning disability, physical disability, sensory impairment, mental health problems and some long term health conditions)</strong></td>
<td></td>
<td>X</td>
<td></td>
<td>Those parent/carers with any identified additional needs will be referred for additional support as appropriate - i.e to the Liaison team or for specialised equipment. Written information will be provided in a format to meet the family’s needs e.g. easy read, audio etc</td>
</tr>
<tr>
<td><strong>Religion/other beliefs</strong></td>
<td></td>
<td>X</td>
<td></td>
<td>All staff should be aware of any beliefs that may impact on treatment decisions.</td>
</tr>
<tr>
<td><strong>Marriage and civil partnership</strong></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pregnancy and maternity</strong></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sexual orientation (bisexual, gay, heterosexual, lesbian)</strong></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If all characteristics are ticked ‘no’, and this is not a major working or service change, you can end the assessment here as long as you have a robust rationale in place.

I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.

**Name of person confirming result of initial impact assessment:**

Dr Chris Bell, Neonatal Guidelines Lead

If you have ticked ‘yes’ to any characteristic above OR this is a major working or service change, you will need to complete section 2 of the EIA form available here: [Section 2. Full Equality Analysis](#).

For guidance please refer to the Equality Impact Assessments Policy (available from the document library) or contact the Human Rights, Equality and Inclusion Lead [debby.lewis@nhs.net](mailto:debby.lewis@nhs.net)