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.

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
A pneumothorax should be suspected in any infant with an increasing oxygen requirement or sudden onset of respiratory distress. There should be a high level of suspicion in any mechanically ventilated infant with an unexplained deterioration in oxygenation, ventilation or cardiovascular status.

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

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

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
CVS stable
Insert chest drain promptly
Re-xray
Observe closely

Large
CVS stable
Insert chest drain promptly
Re-xray
Observe closely

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

Tension Pneumothorax
CVS stable
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.

**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

**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
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.

Indications: Pneumothorax or Pleural Effusion
We stock 2 types of Cook Fuhrman pigtail pleural drain sets
1) 6.0Fr/15cm -use for >1501gms
2) 5.0Fr/15cm -use for <1500gms
Both catheters have 6 side ports

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

Disadvantages
May Kink or obstruct due to its softer consistency

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
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

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.

Procedure
9) 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.
10) 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).
11) 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.
12) 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.
13) 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.
14) Remove the J-wire
15) Use steri-strips to anchor pigtail to the skin.
16) Place transparent sterile dressing over insertion site.
17) Connect catheter to drainage unit using adapter and 3 way stopcock.
18) Dispose of sharps, clean equipment, document procedure
19) 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. Paul Munyard</td>
</tr>
<tr>
<td>Tool</td>
<td>Audit</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>Dr. Paul Munyard. Consultant Paediatrician and Neonatologist.</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>

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

3.2. 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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>November 2016</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>November 2016</td>
</tr>
</tbody>
</table>
### Date Valid To:
November 2019

### Directorate / Department responsible (author/owner):
Sarah Tabrett (Advance Neonatal Nurse Practitioner), Hazel Greene (Paediatric Registrar)

### Contact details:
(01872) 252667

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

### Suggested Keywords:

### Target Audience

<table>
<thead>
<tr>
<th>RCHT</th>
<th>PCH</th>
<th>CFT</th>
<th>KCCG</th>
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</thead>
<tbody>
<tr>
<td>✓</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### Executive Director responsible for Policy:
Executive Director

### Date revised:
November 2016

### This document replaces (exact title of previous version):
New document

### Approval route (names of committees)/consultation:
Consultant approval. Child Health Directorate Audit. Neonatal Clinical Guidelines Group

### Divisional Manager confirming approval processes
David Smith

### Name and Post Title of additional signatories
Not Required

### Signature of Executive Director giving approval
{Original Copy Signed}

### Publication Location (refer to Policy on Policies – Approvals and Ratification):
Internet & Intranet ✓ Intranet Only

### Document Library Folder/Sub Folder

### Links to key external standards
None

### Related Documents:
None

### Training Need Identified?
No
## 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>
</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 on Document Production. 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 Form

| Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as policy): | PNEUMOTHORAX – Neonatal Clinical Guideline |
| Directive and service area: Child and Women’s Health. Neonatal | Is this a new or existing policy? New |
| Name of individual completing assessment: Dr. Paul Munyard. | Telephone: (01872) 252667 |
| 1. Policy Aim* | This guideline is aimed at clinical staff responsible for the management of neonatal infants suspected, or diagnosed with a pneumothorax. |
| Who is the strategy / policy / proposal / service function aimed at? | |
| 2. Policy Objectives* | As above |
| 3. Policy – intended Outcomes* | Audit |
| 4. *How will you measure the outcome? | Audit |
| 5. Who is intended to benefit from the policy? | Clinical staff |
| Patients. | |
| 6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy? | No. Consultant led Neonatal Guidelines meeting approved. |
| b) If yes, have these *groups been consulted? | N/A |
| C). Please list any groups who have been consulted about this procedure. | N/A |

### 7. The Impact

Please complete the following table.

Are there concerns that the policy could have differential impact on:

<table>
<thead>
<tr>
<th>Equality Strands</th>
<th>Yes</th>
<th>No</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
Sex (male, female, trans-gender / gender reassignment) | x
Race / Ethnic communities /groups | x
Disability - learning disability, physical disability, sensory impairment and mental health problems | x
Religion / other beliefs | x
Marriage and civil partnership | x
Pregnancy and maternity | x
Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian | x

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation - this excludes any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended. Yes | No

9. If you are not recommending a Full Impact assessment please explain why.

No area indicated

Signature of policy developer / lead manager / director
Dr Paul Munyard
Date of completion and submission
14 November 2016

Names and signatures of members carrying out the Screening Assessment
1. [Name]
2. [Name]

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead,
c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD
A summary of the results will be published on the Trust’s web site.

Signed _____Kim Smith__________
Date ________14 November 2016_______