Respiratory Support in the Neonate
Clinical Guideline

V2.3

February 2024
Aim/Purpose of this Guideline

1.1. Respiratory distress is a major cause of admission to the Neonatal Unit; and in preterm neonates’ surfactant deficient lung disease remains a major cause of long term morbidity and mortality.

1.2. This guideline provides a framework for the management of neonates presenting with respiratory distress.

1.3. Preterm recommendations are based upon the European Consensus Guidelines on the management of Respiratory Distress Syndrome and the NICE guidelines for specialist neonatal respiratory care for babies born preterm.

1.4. Deviation from this guideline may be required in exceptional circumstances.

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

Data Protection Act 2018 (General Data Protection Regulation – GDPR) Legislation

The Trust has a duty under the Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 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 cannot rely on opt out, it must be opt in.

Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 please see the Information Use Framework Policy or contact the Information Governance Team

Royal Cornwall Hospital Trust  rch-tr.infogov@nhs.net

2. The Guidance

2.1. All term neonates requiring admission for respiratory support should be managed as the flow sheet in Appendix 3.

2.2. All neonates born 32-35+6 requiring admission for respiratory support should be managed as the flow sheet in Appendix 4.

2.3. All neonates born <32 weeks should be managed as the flow sheet in Appendix 5.

2.4. Any neonate with suspected Persistent Pulmonary Hypertension of the Newborn should be managed as per Persistent Pulmonary Hypertension of the Newborn (PPHN).
2.5. **Sepsis** should be considered and treated, where appropriate, as per *Infection In Neonates Early And Late Onset Clinical Guideline*.

2.6. Neonates being ventilated **must** have functioning IV access. **Newborn** neonates requiring invasive respiratory support should have umbilical artery catheter (UAC) and umbilical venous catheter (UVC) inserted.

2.7. **Hypotension** should be managed as per *Neonatal Hypotension Management Clinical Guideline*.

2.8. **Intubation** should be performed in line with *Neonatal Intubation and Management of the Difficult Airway Clinical Guideline*.

2.9. **All neonates who are ventilated must have continuous end tidal waveform capnography.**

2.10. **Ventilation:** The standard mode for neonates having invasive ventilation is Patient Triggered Ventilation (PTV) with Volume Targeted Volume (VTV).

   2.10.1. Suggested settings for neonates receiving PTV with VTV are:

   2.10.1.1. VTV 5ml/kg (normal range 4-8ml/kg).

   2.10.1.2. PEEP 5-6 cm.

   2.10.1.3. Backup rate 30 (>36 weeks), 40 (<36 weeks).

   2.10.1.4. Trigger- 0.2 (24-28 weeks), 0.4 (28-32 weeks), 0.6 (32-36 weeks) 0.8 (>36 weeks).

   2.10.1.5. Max peak inspiratory pressure (PIP) initially at 30. After 10 minutes on the ventilator circuit the Max PIP should be reduced to 5 mbar above the PIP required to deliver the set volume and give good chest wall movement.

2.10.2. Reduction of the backup rate in a neonate breathing spontaneously above the set rate will have minimal to no impact on the ventilator settings.

2.10.3. **Babies not on volume targeted ventilation must not be on PTV; they should be on synchronized intermittent mandatory ventilation (SIMV).**

2.11. Neonates with a large endotracheal tube (ETT) leak or those who are muscle relaxed and are unstable should be managed on SIMV **without** VTV.

   2.11.1. Suggested settings for neonates receiving SIMV depend upon the neonates’ clinical status and the underlying pathology. The volume delivered by the ventilator must be documented.
2.11.2. SIMV with PSV should not be used.

2.12. Blood gas monitoring must occur on all neonates receiving respiratory support.

2.12.1. Ventilated neonates must have a gas at least 4 hourly initially. This should be documented along with the End Tidal CO2 reading.

2.12.1.1. More frequent monitoring must occur in unstable neonates.

2.12.1.2. A CO2 below 4.5 must be acted upon within 10 minutes and the gas repeated within 60 minutes.

2.12.1.3. Significant changes in ETCO2 should prompt a repeat blood gas.

2.12.1.4. Target PCO2 in preterm babies in the first 72 hours of life between 4.5kPa – 8.5kPa.

2.12.1.5. Target PCO2 in preterm babies after 72 hours 4.5kPa-10kPa.

2.12.1.6. PCO2 in term babies should be kept within normal physiological limits (4.5kPa-6kPa) unless directed by a Consultant or on tertiary advice.

2.12.2. Babies on non-invasive respiratory support should have a blood gas at least 6 hourly until stable.

2.12.2.1. More frequent monitoring must occur in unstable neonates.

2.12.2.2. A CO2 below 4.5 must be acted upon within 10 minutes and the gas repeated within 60 minutes.

2.12.2.3. Target PCO2 in preterm babies in the first 72 hours of life between 4.5kPa – 8.5kPa.

2.12.2.4. Target PCO2 in preterm babies after 72 hours 4.5kPa-10kPa.

2.12.2.5. PCO2 in term babies should be kept within normal physiological limits (4.5kPa-6kPa) unless directed by a Consultant or on tertiary advice.

2.12.2.6. Once stable babies on non-invasive respiratory support should have a daily gas (if fully enterally fed) or twice daily gas (if on IV fluids or total parenteral nutrition (TPN)).

2.12.2.7. Stable ex preterm infants with evolving chronic neonatal lung disease (CNLD) can have a blood gas performed less
frequently, if they are fully fed and there are not significant other concerns.

2.13. **Target saturations** in Preterm babies are 91-95%. Term babies, in the absence of **confirmed** congenital cardiac disease, have target saturations of 95-99%. Deviation from these sats limits should occur only on medical advice.

2.14. **Weaning** of respiratory support should be managed as per Appendix 6. ongoing respiratory support.

2.15. **Sedation and Muscle Relaxation**

2.15.1. Routine opiate sedation in <32 week preterm neonates requiring invasive respiratory support is not indicated unless they are assessed to be in pain. Morphine is first choice in these patients. Morphine 100mcg/kg bolus followed by a continuous infusion (10-30mcg/kg/h).

2.15.2. In neonates >32 week gestation requiring invasive respiratory support morphine is the first choice for sedation. Morphine 100mcg/kg bolus followed by a continuous infusion (10-30mcg/kg/h).

2.15.3. Stop sedation for at least 1 hour, and assess respiratory effort, before extubation (see extubation checklist).

2.15.4. Vecuronium bolus (100mcg/kg) followed by infusion is first choice for muscle relaxant in ventilated neonates.

2.16. **Caffeine**: All neonates below 32 weeks, and all neonates <35 weeks requiring respiratory support should receive caffeine. Loading dose 20mg/kg and maintenance starting at 5mg/kg. Doses are as caffeine citrate.

2.17. Neonates with a murmur, or where there may be concerns about congenital cardiac disease should be discussed with a paediatrician with a cardiology interest or a tertiary neonatal consultant. Target saturations should not be changed except on the advice of tertiary consultant or if a diagnosis is made that precludes normal sats limits (e.g., transposition of the great arteries (TGA)/ Hypoplastic Left Heart).

2.18. **Dexamethasone** to aid extubation or weaning of respiratory support should only be given on advice of a tertiary neonatal consultant.

2.19. Respiratory support in patients with known/suspected Oesophageal Atresia/ Tracheoesophageal fistula should occur ideally following discussion with a tertiary neonatal consultant.

2.20. **Management of Ventilation**

2.20.1. Changes to ventilation should only be made on the instruction of an Advanced Neonatal Nurse Practitioner (ANNP)/ Registrar or
2.20.2. The standard increment change for TTV is 0.5ml/kg. Larger changes can be made when required. Smaller changes are rarely beneficial.

2.20.3. Neonates minimally ventilated, on PTV with TTV, who are not extubatable (due to concerns about airway / neurological conditions) should have a positive end expiratory pressure (PEEP) set to 6-7cm to prevent atelectasis.

2.20.4. All patients ventilated should have a chest x-ray (CXR) within 1 hour of intubation. Correct position of the endotracheal tube (ETT) should be documented, or any change made to adjust the tube noted. Confirmation of ETT position can be done clinically and does not require a repeat CXR.

2.21. **Nasal Intermittent Positive Pressure Ventilation (NIPPV-Tr)**- Delivers synchronised inspiratory pressure with background PEEP.

2.21.1. Indications- To be initiated on Consultant Advice Only.

2.21.1.1. short term respiratory escalation for preterm infants with intermittent apnoea or impaired CO2 clearance.

2.21.1.2. To help stabilise infants with a difficult airway or as a measure to pre-optimise prior to intubation and ventilation.

2.21.1.3. Post-extubation support in preterm infants.

2.21.2. Contraindications / Considerations

2.21.2.1. All infants with worsening respiratory distress / rising FiO2 should have cold light exam and repeat Chest Xray.

2.21.2.2. NIPPV should not be used routinely in term infants with increasing respiratory distress/ rising FiO2 (see PPHN guidance for those in >50% O2).

2.21.2.3. Infants with pneumothoraces, meconium aspiration or Oesophageal Atresia with trachy-oesophageal atresia should not receive NIPPV except on the advice of a tertiary neonatologist.

2.21.3. Initial Settings

2.21.3.1. Set NIPPV-Tr.

2.21.3.2. PIP 16-22.
2.21.3.3. PEEP 4-6.

2.21.3.4. Set sensitivity to 100% - which will support every breath.
   - Reduce sensitivity until not every breath is supported.
   - Then increase sensitivity by 10% and maintain setting.

2.21.3.5. Ti 0.30-0.45.

2.21.3.6. RR 40-50.

2.21.4. Weaning and Discontinuing NIPPV-

2.21.4.1. Wean PIP 1-2cm 6h until 12 cm H20.

2.21.4.2. Wean respiratory rate once PIP 12cm.

2.21.4.3. Once respiratory rate 20- convert to appropriate alternative respiratory support.

3. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Information Category</th>
<th>Detail of process and methodology for monitoring compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element to be monitored</td>
<td>In order to monitor compliance with this guideline it will be included in the neonatal clinical audit programme with findings presented at the Child Health directorate audit meeting. Any deficiencies/ action plan will be presented at the Clinical Governance meeting. Any clinical incident reports relating to this guideline will be monitored against it.</td>
</tr>
<tr>
<td>Lead</td>
<td>Neonatal Unit Governance Lead Consultant.</td>
</tr>
<tr>
<td>Tool</td>
<td>Adherence to guidelines will be monitored as part of the ongoing audit process within the neonatal unit on a MS word or Excel template.</td>
</tr>
<tr>
<td>Frequency</td>
<td>Within neonatal audit programme.</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Any incident arising or audit findings out with the protocol will be presented at Child Health Directorate Governance meeting.</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>Any case where these criteria are not met will be discussed and additional training needs identified and acted upon.</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Lessons will be shared with all the relevant staff/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 and 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>Information Category</th>
<th>Detailed Information</th>
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<tbody>
<tr>
<td><strong>Document Title:</strong></td>
<td>Respiratory Support in the Neonate Clinical Guideline V2.3</td>
</tr>
<tr>
<td><strong>This document replaces (exact title of previous version):</strong></td>
<td>Respiratory Support in the Neonate Clinical Guideline V2.2</td>
</tr>
<tr>
<td><strong>Date Issued/Approved:</strong></td>
<td>February 2024</td>
</tr>
<tr>
<td><strong>Date Valid From:</strong></td>
<td>February 2024</td>
</tr>
<tr>
<td><strong>Date Valid To:</strong></td>
<td>April 2025</td>
</tr>
<tr>
<td><strong>Directorate / Department responsible (author/owner):</strong></td>
<td>Chris Bell; Paediatric Consultant with interest in Neonatology</td>
</tr>
<tr>
<td><strong>Contact details:</strong></td>
<td>01872 252669</td>
</tr>
<tr>
<td><strong>Brief summary of contents:</strong></td>
<td>Outline for respiratory management of babies on the neonatal unit</td>
</tr>
<tr>
<td><strong>Suggested Keywords:</strong></td>
<td>CPAP, High flow, Neonate, Respiratory support, Ventilation</td>
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| **Target Audience:**                                     | RCHT: Yes  
CFT: No  
CIOS ICB: No                                                                                                                                                    |
| **Executive Director responsible for Policy:**            | Chief Medical Officer                                                                                                                                                                                            |
| **Approval route for consultation and ratification:**     | Neonatal Guidelines Group                                                                                                                                      |
| **General Manager confirming approval processes:**        | Caroline Chappell                                                                                                                                                                                                  |
| **Name of Governance Lead confirming approval by specialty and care group management meetings:** | Tamara Thirly                                                                                                                                                                                                      |
| **Links to key external standards:**                     | None required                                                                                                                                                                                                     |
| **Related Documents:**                                   | NICE and European Consensus RDS guidelines                                                                                                                    |
| **Training Need Identified?**                            | No                                                                                                                                                                                                                 |
Information Category | Detailed Information
---|---
Publication Location (refer to Policy on Policies – Approvals and Ratification): | Internet and Intranet
Document Library Folder/Sub Folder: | Clinical/ Neonatal

Version Control Table

<table>
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<th>Date</th>
<th>Version Number</th>
<th>Summary of Changes</th>
<th>Changes Made by</th>
</tr>
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<tr>
<td>October 2019</td>
<td>V1.0</td>
<td>Initial version</td>
<td>Chris Bell, Paediatric Consultant with Neonatal Interest</td>
</tr>
<tr>
<td>March 2022</td>
<td>V2.0</td>
<td>Renamed TTV to VTV Addition of section on less frequent gases on patients with established CNLD Addition of NIPPV section Rewording of flow section</td>
<td>Chris Bell, Paediatric Consultant with Neonatal Interest</td>
</tr>
<tr>
<td>June 2022</td>
<td>V2.1</td>
<td>Section 2.10.1.3 updated</td>
<td>Chris Bell, Paediatric Consultant with Neonatal Interest</td>
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<tr>
<td>November 2022</td>
<td>V2.2</td>
<td>Sepsis link updated Flow charts updated to include requirement for early cxr</td>
<td>Chris Bell, Paediatric Consultant with Neonatal Interest</td>
</tr>
<tr>
<td>January 2024</td>
<td>V2.3</td>
<td>Appendices 3, 4 and 5- optimal cord management updated. Appendix 3- changes to oxygen levels and high flow range. Appendix 6- Changes to indices for coming off CPAP.</td>
<td>E Lawes Paediatric Consultant with Neonatal Interest</td>
</tr>
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All or part of this document can be released under the Freedom of Information Act 2000.

All Policies, Strategies and Operating Procedures, including Business Plans, are to be kept for the lifetime of the organisation plus 6 years.

This document is only valid on the day of printing.

Controlled Document.

This document has been created following the Royal Cornwall Hospitals NHS Trust The Policy on Policies (Development and Management of Knowledge Procedural and Web

Respiratory Support in the Neonate Clinical Guideline V2.3

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Documents Policy). It should not be altered in any way without the express permission of the author or their Line Manager.
Appendix 2. Equality Impact Assessment

Section 1: Equality Impact Assessment (EIA) Form

The EIA process allows the Trust to identify where a policy or service may have a negative impact on an individual or particular group of people.

For guidance please refer to the Equality Impact Assessment Policy (available from the document library) or contact the Equality, Diversity and Inclusion Team rcht.inclusion@nhs.net

<table>
<thead>
<tr>
<th>Information Category</th>
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</tr>
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<tbody>
<tr>
<td>Name of the strategy / policy / proposal / service function to be assessed:</td>
<td>Respiratory Support in the Neonate Clinical Guideline V2.3</td>
</tr>
<tr>
<td>Directorate and service area:</td>
<td>Neonatal</td>
</tr>
<tr>
<td>Is this a new or existing Policy?</td>
<td>Existing</td>
</tr>
<tr>
<td>Name of individual completing EIA (Should be completed by an individual with a good understanding of the Service/Policy):</td>
<td>Neonatal Audit and Guidelines Group</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 252669</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information Category</th>
<th>Detailed Information</th>
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</thead>
<tbody>
<tr>
<td>1. Policy Aim - Who is the Policy aimed at? (The Policy is the Strategy, Policy, Proposal or Service Change to be assessed)</td>
<td>Neonatal doctors and nurses working with neonates with respiratory distress.</td>
</tr>
<tr>
<td>2. Policy Objectives</td>
<td>Ensure consistent, evidence based management of neonates with respiratory distress.</td>
</tr>
<tr>
<td>3. Policy Intended Outcomes</td>
<td>To improve the well-being of patients by offering the appropriate management of patients.</td>
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<tr>
<td>4. How will you measure each outcome?</td>
<td>Audit/Multidisciplinary team weekly discussion/incidents/risk management.</td>
</tr>
<tr>
<td>5. Who is intended to benefit from the policy?</td>
<td>Patients.</td>
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### Information Category

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<tr>
<th>Detailed Information</th>
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</thead>
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| **6a. Who did you consult with?**  
(Please select Yes or No for each category) |
| - Workforce: Yes  
- Patients/ visitors: No  
- Local groups/ system partners: No  
- External organisations: No  
- Other: No |

| **6b. Please list the individuals/groups who have been consulted about this policy.** |
| Please record specific names of individuals/ groups: Neonatal Audit and Guidelines Group |

| **6c. What was the outcome of the consultation?** |
| Approved. |

| **6d. Have you used any of the following to assist your assessment?** |
| National or local statistics, audits, activity reports, process maps, complaints, staff or patient surveys: No. |

### 7. The Impact
Following consultation with key groups, has a negative impact been identified for any protected characteristic? Please note that a rationale is required for each one.

Where a negative impact is identified without rationale, the key groups will need to be consulted again.

<table>
<thead>
<tr>
<th>Protected Characteristic</th>
<th>(Yes or No)</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Sex (male or female)</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Gender reassignment</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>(Transgender, non-binary, gender fluid etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>No</td>
<td>Any information provided should be in an accessible format for the parent/ carers needs- i.e. available in different languages if required/access to an interpreter if required.</td>
</tr>
<tr>
<td>Protected Characteristic</td>
<td>(Yes or No)</td>
<td>Rationale</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Disability (e.g. physical or cognitive impairment, mental health, long term conditions etc.)</td>
<td>No</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>Religion or belief</td>
<td>No</td>
<td>All staff should be aware of any beliefs that may impact on the decision to treat and should respond accordingly.</td>
</tr>
<tr>
<td>Marriage and civil partnership</td>
<td>No</td>
<td>All staff should be aware of any marital arrangements that may have an impact on care (for example: separated parents, domestic abuse).</td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Sexual orientation (e.g. gay, straight, bisexual, lesbian etc.)</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

A robust rationale must be in place for all protected characteristics. If a negative impact has been identified, please complete section 2. If no negative impact has been identified and if this is not a major service change, you can end the assessment here.

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: Neonatal Audit and Guidelines Group

If a negative impact has been identified above OR this is a major service change, you will need to complete section 2 of the EIA form available here: [Section 2. Full Equality Analysis](#)
Appendix 3. Respiratory Support in Neonates 36 Weeks and Older

Neonates 36 weeks and older.

Antenatal Steroids whenever indicated. Optimal cord management, aiming for 3 minutes unless significant compromise at birth (at least 1 minute). Manage as per NLS. Requiring admission for respiratory support at 30 mins of age.

- **FiO2 >21% and <50% at admission to NNU.**
  - Commence HFNC 6-8L.
  - Septic screen and IVAB.
  - CXR request at admission. Do not wait for 4 hours.
  - Consider alternative diagnosis if FiO2 rising (PPHN/ Sepsis/ Pneumothorax / cardiac cause).
  - Fio2 stable <50%and CVS stable.
  - Consider LISA if RDS on CXR and FiO2 30-49% in 1st 6hours.
  - Wean HFNC as able.

- **FiO2 50% or more at admission. Manage as per PPHN guideline.**
  - Ventilated.
  - Manage as per ventilation section.

- **Ventilated.**
  - Manage as per ventilation section.

- FiO2 rising >50%, respiratory unstable or poor gas exchange.
  - Discuss with NNU consultant. Consider intubation.
  - Septic screen and IVAB.
  - CXR (4 hours if stable, earlier if concerns)
  - Consider alternative diagnosis if FiO2 rising (PPHN/ Sepsis/ Pneumothorax / cardiac cause).
Appendix 4. Respiratory Support in Neonates 32-35 +6 Weeks

Antenatal steroids and mag sulph whenever indicated. Optimal cord management, aiming for 3 minutes unless significant compromise at birth (at least 1 minute). Commence facemask 6cm PEEP in 21% O2 immediately on transfer to resuscitaire Manage as per NLS.

Self-ventilating in air.
Admit NNU / TCW where appropriate. Low threshold to start HFNC if respiratory distress.

Stabilised with face mask PEEP O2.
Admit NNU. Commence CPAP 6-8cm (if FiO2 >=40%). Commence HFNC (if FiO2 <40%). Septic screen, IV fluids/ TPN (and caffeine if <34w). Review within 1 hour. CXR- request at admission.

VentilatedGive surfactant 200mg/kg.
Admit NNU. PTV- Standard settings. TTV 5ml/kg. Rate 30-40. Ti 0.36. Max PIP start at 30. Septic screen, IV fluids/ TPN and Caffeine. Manage as per ventilation section.

FiO2 <30% and stable gases.
Continue respiratory support. 4-6 hours gases first 24 hours.

FiO2 30-60% and stable gases.
LISA 200mg/kg curosurf. CPAP 6-8cm if no improvement. CXR. Review 1 hour.

FiO2 >60% and/or unstable.
Inform NNU Consultant. Intubate and ventilate. Give 200mg/kg Curosurf. PTV- Standard settings. TTV 5ml/kg. Rate 30-40. Ti 0.36. Max PIP start at 30. Manage as per ventilation section.

FiO2 reduced <30% and stable.
Manage as per Non-invasive respiratory support section.

FiO2 >30% or unstable.
Consider:
- Alternative diagnosis (PPHN/ Sepsis/ Pneumothorax / cardiac cause).
- Repeat LISA- 100mg/kg curosurf if stable (after 12 hours).
- Intubation and ventilation.
- NIPPV.
Appendix 5. Respiratory Support in Neonates <32 Weeks

**Neonates < 32 weeks.**

- **Antenatal steroids and magnesium sulphate.**
  Optimal cord management, aiming for 3 minutes unless significant compromise at birth (at least 1 minute).
  Commence facemask 6cm PEEP in 30% O2 immediately on transfer to resuscitaire Manage as per NLS.

- **Stabilised with facemask. PEEP in <40% O2.**
  Admit NNU. Commence CPAP 6-8cm. Septic screen, IV fluids/TPN and caffeine. CXR within 2 hours. Review at 1 hour.

- **Stabilised with facemask. PEEP in 40% or more O2.**
  Admit NNU. Commence CPAP 6-8cm. Septic screen, IV fluids/TPN and caffeine. Review once access obtained. Urgent CXR.

- **Ventilated. Give surfactant 200mg/kg.**
  Admit NNU. PTV- Standard settings. TTV 5ml/kg. Rate 30-40. Ti 0.36. Max PIP start at 30. Septic screen, IV fluids/TPN and caffeine. Manage as per ventilation section.

- **FiO2 30-50% and CVS stable with PaCO2 <8. No expected airway abnormality.**
  LISA 200mg/kg (see LISA protocol).

- **FiO2 >50% and/ or PaCO2 >8. CVS Stable. No expected airway abnormality.**
  Intubate and ventilate. Give 200mg/kg curosurf. PTV- Standard settings. TTV 5ml/kg. Rate 30-40. Ti 0.36. Max PIP start at 30. Manage as per ventilation section.

- **FiO2 >50% and/ or PaCO2 >8. CVS unstable. Expected airway abnormality.**
  Inform NNU consultant. Urgent CXR. Intubate and ventilate. Give 200mg/kg curosurf. PTV- Standard settings. TTV 5ml/kg. Rate 30-40. Ti 0.36. Max PIP start at 30. Manage as per ventilation section.

- **LISA procedure completed successfully. FiO2 <=30% within 1 hour.**
  Continue CPAP 6-8cm. Consider LISA further dose curosurf (100mg/kg) after 12 hours if FiO2 increases >30%. Manage as per Non-invasive respiratory.

- **LISA procedure unsuccessful OR FiO2 >30% within 1 hour.**
  Consider Intubation and ventilation. Give Curosurf (200mg/kg if first dose, 100mg/kg if second dose). PTV- Standard settings. TTV 5ml/kg. Rate 30-40. Ti 0.36. Max PIP start at 30. Manage as per ventilation section.

- **In infants with persistent hypercapnoea or low respiratory drive consider NIPPV on consultant advice.**

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Appendix 6. Ongoing Respiratory Support

Ventilated neonate needing extubation.

**Term neonate with no underlying lung disease.**
- Extubate to air if good respiratory drive. *Gas 1 hour post extubation.*

**32-36 weeks or term with underlying lung disease.**
- Extubate to HFNC: 2L/kg. *Gas 1 hour post extubation.*

**<32 weeks or significant lung disease.**
- Extubate to CPAP 6-8cm. *Gas 1 hour post extubation.*

**Neonate on CPAP.**
- Once stable gases and FiO2 <30%.
  - <32w: Wean 1cm every 24 hours.
  - >32w: Wean 1cm every 12 hours.
  - Wean more frequently if CO2 <4.5 but beware of rising FiO2.
- Once CPAP 4cm H2O and in 21% try coming off respiratory support.
  - Consider restarting CPAP or High Flow if significant increase in oxygen requirement or PaCO2 increase >1KpA.
- <32 week neonates in <30% O2 with good gas exchange can wean 1L HFNC every 24 hours, if stable, to a minimum of 2.5L.
- <32 week neonates in 30% or more O2 with good gas exchange can wean 0.5L every 24 hours, if stable, to a minimum of 2.5L.
- 32-35 week neonates in <30% O2 with good gas exchange can wean 1L HFNC every 24 hours, if stable, to a minimum of 2.5L.
- 32-35 week neonates in 30% or more O2 with good gas exchange can wean 0.5L every 24 hours, if stable, to a minimum of 2.5L.
- Neonates >35 weeks can wean by 1L every 6 hours if stable.
- Neonates on 2.5L can have a trial in air or Low flow if stable. If this is not tolerated they should recommence high flow at 4L.
- Neonates with PDA/Congenital Cardiac Disease should not have their respiratory support routinely weaned without discussion with a local Paediatric Cardiology interest consultant.

**Neonate on HFNC.**
- Babies can be weaned more quickly, or removed from respiratory support earlier at the discretion of senior medical staff.
- Consider changing to low flow oxygen if still requiring >21% oxygen and PaCO2/work of breathing acceptable.