Neonatal respiratory distress
including CPAP
Clinical Guideline Presentation v2.0
References:
The Queensland Clinical Guideline  *Neonatal respiratory distress including CPAP* is the primary reference for this package.

Recommended citation:

Disclaimer:
This presentation is an implementation tool and should be used in conjunction with the published guideline. This information does not supersedes or replace the guideline. Consult the guideline for further information and references.

Feedback and contact details:

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# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Term</th>
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<tbody>
<tr>
<td>BGL</td>
<td>Blood glucose level</td>
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<tr>
<td>CSCF</td>
<td>Clinical services capability framework</td>
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<tr>
<td>CPAP</td>
<td>Continuous positive airway pressure</td>
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<tr>
<td>CXR</td>
<td>Chest x-ray</td>
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<tr>
<td>OGT</td>
<td>Oral gastric tube</td>
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<tr>
<td>PCO₂</td>
<td>Partial pressure of carbon dioxide</td>
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<td>RDS</td>
<td>Respiratory distress syndrome</td>
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<tr>
<td>SpO₂</td>
<td>Peripheral saturation of oxygen</td>
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Objectives

• Identify neonates requiring respiratory support following birth
  ◦ Diagnosis and management of respiratory distress
  ◦ Indications for transfer/retrieval

• Review the management principles for a neonate requiring CPAP
Signs of respiratory distress

- Tachypnoea (> 60 breaths/minute)
- Audible expiratory grunt
- Sternal, intercostal/lower costal recession
- Nasal flaring
- Cyanosis or $O_2$ requirement
Causes of respiratory distress

- Hyaline membrane disease
- Infection – Group B streptococcal disease
- Retained fetal lung fluid – Transient tachypnoea of the newborn (TTN)
- Aspiration – meconium, blood or liquor
- Pneumothorax
- Congenital abnormalities
Oxygenation

• Give O₂ to maintain SpO₂ 92–96%

• Continuously monitor:
  ◦ O₂ concentration
  ◦ SpO₂ – preferably on right upper limb
  ◦ Respiration and heart rate
Blood cultures

- Collect blood cultures and full blood count
- Collect surface swabs if indicated
- Check blood culture results:
  - At 24 hours
  - Again at 48 hours
- If positive, contact higher level service to discuss duration of antibiotic therapy
Antibiotics

• Aim to commence within 30 minutes of diagnosis
• If no local policy, recommend:
  ◦ Penicillin 60 mg/kg/dose 12 hourly OR
  ◦ Ampicillin 50 mg/kg/dose 12 hourly AND
  ◦ Gentamicin 2.5mg/kg ≥ 30 weeks daily or if < 30 weeks every 36 hours
• Check Gentamicin level before 3rd dose
Fluids

- Insert IV cannula and commence fluids 10% Dextrose at 60 mL/kg/day
- Consider umbilical venous catheter if IV difficult to achieve
- Small trophic feeds (2 mL/kg 3 hourly) may be started if stable and respirations comfortable
Chest x-ray

• To identify pathology - especially:
  ◦ Pneumothorax
  ◦ Congenital diaphragmatic hernia
  ◦ Chest masses

• Level 3 neonatal services
  ◦ Arrange review at Level 5 or Level 6 Nursery
Blood glucose

• Refer to Queensland Clinical Guideline: *Newborn hypoglycaemia*

• Aim for BGL 2.6 mmol/L or greater

• Treat BGL < 2.6 mmol/L

• Monitor 4–6 hourly for 24 hours or as indicated by BGL
Supportive care

• Maintain temperature
  ◦ Axillary 36.8–37.2°C
  ◦ Skin 36–36.2°C
• Minimal handling – disturb only when absolutely necessary
• Blood gases not routinely required
Consultation and referral

• Level 2 and 3* - Contact a higher level service to discuss:
  ◦ Initiation of treatment
  ◦ If O₂ requirements reach 30%
  ◦ If O₂ need rapidly rises (>10% over 2 hours)
  ◦ If neonate < 35 weeks gestation
  ◦ Daily for ongoing advice and support

• Level 6 can be contacted by any level of service for advice

*Nursery levels according to Clinical Services Capability Framework
CPAP

- Continuous Positive Airway Pressure (CPAP) is the application of positive pressure to the airways of spontaneously breathing neonates throughout the respiratory cycle.
- Manage in Level 4 nursery or above.
- Resource requirements (human and equipment) as per CSCF.
Benefits of CPAP

• Reduces O$_2$ requirements
• Reduces the work of breathing
• Reduces apnoea, bradycardia & episodes of O$_2$ desaturation
• Decreases need for ventilation
• Reduces risk of extubation failure
• Reduces the natural duration of RDS
• May prevent the need for transfer
Indications for CPAP

• Signs of respiratory distress
• $O_2$ requirement $\geq 30\%$ to maintain $SpO_2$ 92–96%
• Commence on CPAP if $O_2$ requirement < 30% and there are other significant signs of respiratory distress
Patient interface

- CPAP generator creates pressure in circuit
- Circuit for continuous flow of humidified gasses
- Interface device to connect to neonate’s airway
Patient interface

• Short binasal prong
  ◦ Hudson prongs
  ◦ Snorkel midline device
• Nasal mask
• Long nasopharyngeal tube
  ◦ Not routinely recommended
Commencing CPAP

• Commence CPAP at 8 cm H$_2$O
  ◦ Starting high and decreasing with improvement is preferable to starting low and increasing with deterioration
• Give O$_2$ to maintain SpO$_2$ 92–96%
• Use gas flow at the lowest level that achieves desired pressure
Expected clinical course

- Acute disease normally lasts 1–3 days
- Signs of improvement
  - ↓ in respiratory rate
  - ↓ work of breathing (grunting, sternal/intercostal recession, nasal flaring)
  - ↓ in O₂ needs
  - Improved CXR appearance/lung volume
  - Improved blood gas (if measured)
Weaning CPAP

- Commence weaning when:
  - $\text{SpO}_2$ consistently $> 96\%$
  - Grunting ceased/recession reduced
- Wean $\text{O}_2$ before pressure
  - Wean to 21\% then
  - Pressure 1 cm every 2–4 hours until 5 cm H$_2$O is reached
- Cease when stable in 21\% and 5 cm H$_2$O
Deterioration

• Signs of failure of CPAP delivery
  ◦ $O_2 > 50\%$ to maintain $\text{SpO}_2$ 92–96%
  ◦ Rapid rise in $O_2$ requirement
  ◦ Respiratory acidosis ($\text{pH} < 7.25$)
  ◦ Recurrent apnoeic episodes
  ◦ Increased work of breathing

• Requires immediate medical assessment and CXR
Complications: Air Leaks

• Air leak syndromes (pneumothorax, pneumomediastinum, pneumopericardium, pulmonary interstitial emphysema (PIE))

• Clinical signs:
  ○ Increasing respiratory distress/↑PCO₂
  ○ Oxygen desaturation
  ○ Decreased air entry/asymmetrical chest movement or appearance
Pneumothorax

• Emergency management when neonate rapidly deteriorating:
  ◦ Needle thoracocentesis
  ◦ Intercostal catheter

• Refer to Appendix B in Guideline
Complications: Pressure injury

- Results from pressure of CPAP devices
- Source of discomfort, site for infection, long term functional and/or cosmetic sequelae
- Requires vigilant clinical surveillance to avoid pressure, traction, friction and moisture
Pressure injury prevention

• Measure and size interface for each neonate
• Position binasal prongs with 2 mm gap between horizontal section and nose
  ◦ No blanching of surrounding skin
• With cares inspect for signs of pressure injury
• Document presence/absence, location and extent of any injury
Complications: Other

• **Abdominal distension** - gas enters stomach and gastrointestinal tract
  ◦ Insert shortest available OGT, aspirate or free drainage
  ◦ Use size 8 FG - especially if large air aspirates or abdominal distension
  ◦ Use lowest flow of gas to achieve pressure

• **Over inflation** - excessive pressure can:
  ◦ Increase work of breathing
  ◦ Reduce cardiac output
Monitoring

• Continuously:
  ◦ Heart rate, Respiratory rate, SpO₂, PiO₂

• Vigilant surveillance:
  ◦ Circuit integrity & equipment function, condensation
  ◦ Interface correctly positioned
  ◦ OGT position,
  ◦ Abdominal distension
Neonatal care

- Suction – as required
- Cares 4–6 hourly with 1–2 staff
- Inspect for pressure injury with cares
- Aspirate OGT regularly
- Minimal handling
- Incorporate principles of developmental care
- Use a family centred approach
Other therapies

• Prophylactic CPAP
  ◦ Not recommended

• Humidified high flow nasal cannula
  ◦ Routine use instead of CPAP for acute lung disease is not recommended

• INSURE technique
  ◦ Routine use followed by CPAP not recommended for ≥ 32 weeks gestational age
Key Points

• Timely and appropriate management of respiratory distress improves outcomes

• Use the statewide guidelines to guide management

• Contact a higher level nursery for support and advice when necessary

• Involve the parents