Neonatal respiratory distress including CPAP

Clinical Guideline Presentation

45 minutes

Towards your CPD Hours

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

Recommended citation:
Queensland Clinical Guidelines. *Neonatal respiratory distress including CPAP* Clinical guideline education presentation E14.3-1-V3-R19 Queensland Health. 2014.

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

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Abbreviations

Abbreviation	Term
BGL	Blood glucose level
CSCF	Clinical services capability framework
CPAP	Continuous positive airway pressure
CXR	Chest x-ray
OGT	Oral gastric tube
PCO_2	Partial pressure of carbon dioxide
RDS	Respiratory distress syndrome
SpO_2	Peripheral saturation of oxygen

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 O_2 to maintain SpO_2 within target ranges
  - Term baby: 92–98%
  - Preterm baby: 90–95%

- Continuously monitor:
  - O_2 concentration
  - SpO_2 – preferably on right upper l
  - 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

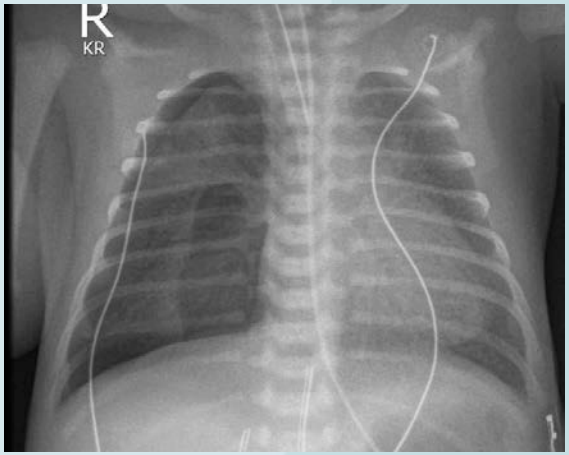
  AND
  - Gentamicin 2.5mg/kg ≥ 30 weeks daily or if < 30 weeks every 36 hours
- Check Gentamicin level before 3rd dose

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 O_2 requirements reach 30%
  - If O_2 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 ≥ 30% to maintain SpO_2 within target range
- 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

Bubble CPAP System

Patient interface

- Short binasal prong
  - Hudson prongs
  - Snorkel midline device
- Nasal mask
- Long nasopharyngeal tube
  - Not routinely recommended

Hudson

Snorkel

Commencing CPAP

- Commence CPAP at 8 cm H_2O
  - Starting high and decreasing with improvement is preferable to starting low and increasing with deterioration
- Give O_2 to maintain SpO_2 within target range
- 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 O_2 needs
  - Improved CXR appearance/lung volume
  - Improved blood gas (if measured)

Weaning CPAP

- Commence weaning when:
  - SpO_2 consistently > target range
  - Grunting ceased/recession reduced
- Wean O_2 before pressure
  - Wean to 21% then
  - Pressure 1 cm every 2–4 hours until 5 cm H_2O is reached
- Cease when stable in 21% and 5 cm H_2O

Deterioration

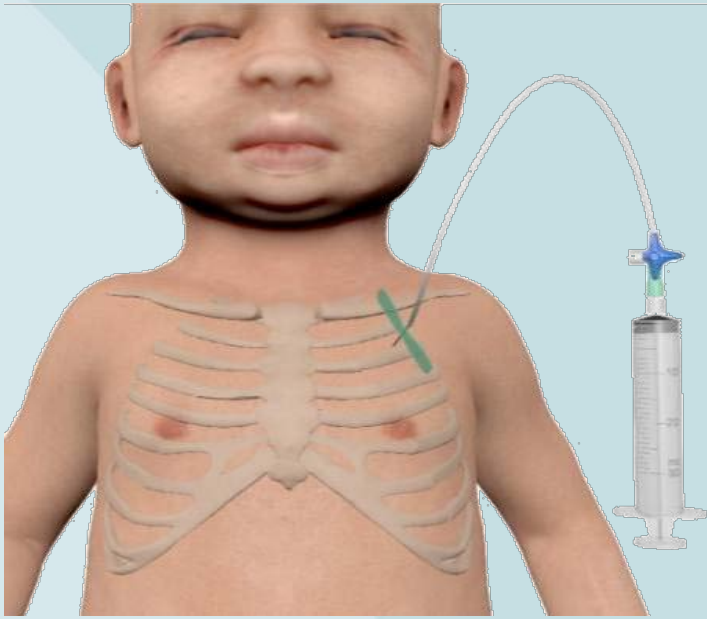
- Signs of failure of CPAP delivery
  - O_2 > 50% to maintain SpO_2
  - Rapid rise in O_2 requirement
  - Respiratory acidosis (pH < 7.25)
  - Recurrent apnoeic episodes
  - Increased work of breathing
- Requires immediate medical assessment and CXR

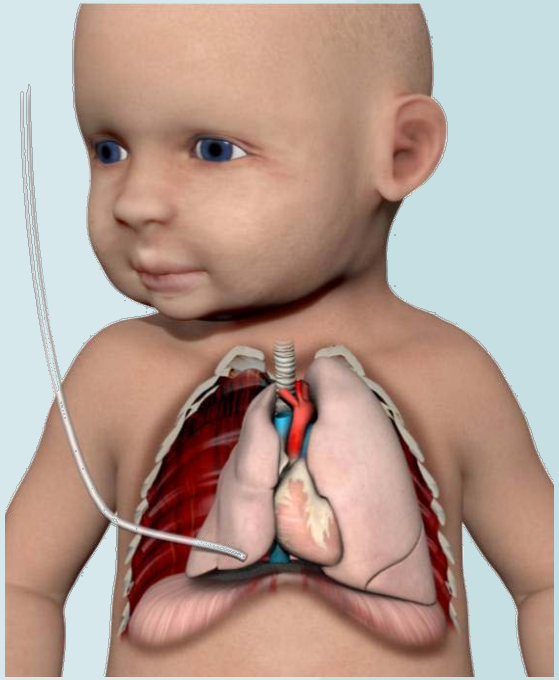
Complications: Air Leaks

- Air leak syndromes (pneumothorax, pneumomediastinum, pneumopericardium, pulmonary interstitial emphysema (PIE))
- Clinical signs:
  - Increasing respiratory distress/↑PCO_2
  - 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, SpO_2, PiO_2
- 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