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Cochrane Review summary: High flow nasal cannula for respiratory support in preterm infants

Clinical context

In the preterm infant requiring respiratory support for apnoea, respiratory distress syndrome (RDS) or chronic lung disease (CLD), a variety of non-invasive ventilation options are available. Nasal continuous positive airway pressure (CPAP) is commonly used as an alternative to endotracheal intubation and more recently, high flow nasal cannula (HFNC) is being used to deliver positive end-expiratory pressure (PEEP), oxygen, blended oxygen and air.

Both methods however may have adverse effects despite being moderately easy to apply and manage. The most significant risks related to nasal CPAP are nasal trauma and distortion of the nares, and for HFNC, mucosal irritation, obstruction, nosocomial infection and possible lung injury from PEEP which is not measured and inconsistent.

The aim of this Cochrane Review was to compare the safety and efficacy of HFNC with other forms of non-invasive respiratory support in preterm infants.

Inclusion criteria

Studies

Randomised and quasi-randomised studies (including crossover trials).

Participants

Preterm infants (<37 weeks gestational age) receiving respiratory support after birth with or without a prior period of intermittent positive pressure ventilation (IPPV).

Intervention

HFNC oxygen - defined as the delivery of oxygen or blended oxygen and air via a nasal cannula at flow rates of >1 litre per minute (lpm).

Alternative interventions included: head box oxygen, low flow (≤1 lpm) nasal cannulae, nasal CPAP, non-invasive IPPV, HFNC using an alternative technique (e.g. humidified versus non-humidified, or different models of HFNC).

Outcomes

The primary outcomes included death (prior to discharge), CLD and need for reintubation. Secondary outcomes included duration of respiratory support, length of stay, air leak syndromes, nasal trauma, nosocomial sepsis, gastrointestinal complications, growth, days to full feeds, retinopathy of prematurity and neurodevelopmental outcomes.

Results

Four small trials including 177 infants were identified for inclusion in the review. One study is awaiting assessment and there were a further five studies identified that are currently in progress.

Each study differed in the intervention compared, the flow rate and indication for use:

- HFNC compared to nasal CPAP in preterm infants for treatment or prophylaxis of RDS and post extubation;
- Humidified HFNC to non-humidified HFNC in preterm infants post extubation
- and two types of humidified HFNC equipment used in preterm infants post extubation.

Risk of bias: Risk of selection bias was generally low, performance and detection bias generally high.

One trial found no difference in the rates of failure in infants treated with HFNC (n=4/33) and nasal CPAP (n=4/34) when used as the primary respiratory support after birth (Relative Risk, RR, 1.03; 95% CI 0.28 to 3.78).

One trial found a significantly higher risk of reintubation in those infants treated with HFNC (n=12/20) compared with nasal CPAP (n=3/20) when used following extubation (RR 4.0; 95% CI 1.33 to 12.05).

There was no significant difference in the need for reintubation in the one trial comparing humidified (n=0/15) and non-humidified (n=2/15) HFNC (RR 0.17; 95% CI 0.01 to 3.34) and no difference found in the one trial comparing two different models of equipment used to deliver humidified HFNC (RR 1.35, 95% CI 0.31 to 5.90).

For all studies where secondary outcomes were measured these did not differ between groups.

Authors' conclusions

Implications for practice

Currently there is insufficient evidence to determine the safety and efficacy of HFNC for respiratory support in preterm infants. HFNC may be associated with a higher rate of reintubation when used following extubation than nasal CPAP.

Implications for research

Further randomised controlled trials in preterm infants comparing HFNC with nasal CPAP and other means of respiratory support, or of support following extubation are required. Trials need to be sufficiently powered to detect differences in clinically important outcomes including death, CLD, need for mechanical ventilation and duration of respiratory support. If HFNC is shown to be effective, further research should aim to establish in which subgroups of infants and which type of delivery (eg nasal cannula size, flow rates, temperature and humidity settings).

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