Introduction

• Heated humidified high flow nasal cannula (HHHFNC) devices are being used as an alternative to nasal continuous positive airway pressure (nCPAP) to treat conditions such as respiratory distress syndrome, apnea of prematurity, and to prevent extubation failure.

• HHHFNC appears to be less invasive, tolerated better by infants1, and allows for improved parent and infant interaction2,3.

• The use of HHHFNC has increased and been proposed as an alternative to nCPAP but the safety and efficacy of this form of respiratory support in the neonatal population has not been established as routine practice4.

Objectives

To assess the safety and efficacy of HHHFNC as compared to nCPAP to provide non-invasive respiratory support for preterm and term neonates in the neonatal intensive care setting.

Methods

Databases searched: Cochrane Central Register of Controlled Trials (CENTRAL), Issue 3 of 2012 with 2014 (The Cochrane Library), EMBASE, MEDLINE, EMBASE, PUBMED, CINAHL and SCOPUS, ClinicalTrials.gov, Australia New Zealand Clinical Trials Registry, and World Health Organization International Trials Registry Platform.

• Request made to Fisher & Paykel Healthcare Ltd and Vapotherm Inc. for any known unpublished studies.

• An attempt was made to obtain results from an unpublished study by Nair and Karna (2005) but was unsuccessful due to lack of contact details.

Selection criteria: Randomised controlled trials (RCT) comparing HHHFNC with nCPAP for neonates of any gestational age (preterm and term).

Data collection and analysis:

• Two reviewers (CP and FR) independently assessed each study for inclusion and extracted data from studies.

• Data collected by the author (CP) was recorded in a Microsoft Word document, using a layout based on the Cochrane handbook for systematic reviews of interventions5 (version 5.1.0, checklist from table 7.3a).

• Extracted data was checked by the second reviewer (FR).

• Cochrane Collaboration methodological procedures were used.

• Review manager (RevMan version 5.2) software was used to analyse and present data as forest plots using fixed effect models.

• Risk ratios and p values were calculated. Results were considered significant if the p value was less than 0.05.

• Data entered into RevMan software was checked for accuracy by the second reviewer (FR).

• Studies excluded were those that were not available in English due to time and resource constraints.

Results

Table 1. Characteristics of included studies

<table>
<thead>
<tr>
<th>Study</th>
<th>nCPAP</th>
<th>HHHFNC</th>
<th>Mean birth weight (g)</th>
<th>Mean gestational age (weeks)</th>
<th>Required intubation &amp; GA ≥ 28 weeks</th>
<th>Birth weight ≥ 1000g</th>
<th>Follow up until discharge</th>
<th>Study duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collins 2013</td>
<td>1105 (374)</td>
<td>1123 (317)</td>
<td>27.6 (1.97)</td>
<td>376 (21)</td>
<td>1108 (374)</td>
<td>1102 (374)</td>
<td>7 days</td>
<td>7 days</td>
</tr>
<tr>
<td>Ojha 2013</td>
<td>100 (20)</td>
<td>1041 (338)</td>
<td>27.5 (1.0)</td>
<td>376 (21)</td>
<td>1000 (20)</td>
<td>1000 (20)</td>
<td>7 days</td>
<td>7 days</td>
</tr>
<tr>
<td>Nair 2005</td>
<td>2108 (782)</td>
<td>2201 (667)</td>
<td>27.7 (2.1)</td>
<td>376 (21)</td>
<td>2108 (782)</td>
<td>2108 (782)</td>
<td>7 days</td>
<td>7 days</td>
</tr>
<tr>
<td>Yoder 2013</td>
<td>232 (70)</td>
<td>245 (72)</td>
<td>27.8 (2.2)</td>
<td>376 (21)</td>
<td>232 (70)</td>
<td>232 (70)</td>
<td>7 days</td>
<td>7 days</td>
</tr>
</tbody>
</table>

Discussion

• Five studies were selected for inclusion.

• Three studies7-9 compared HHHFNC to nCPAP, one study5 compared Vapotherm™ to nCPAP, and one study6 compared ComfortFlo™ to nCPAP.

• Heated Humidified High Flow Nasal Cannula Compared To Nasal CPAP: A Systematic Review and Meta-analysis

• Quality of evidence for each outcome assessed using the GRADE approach and randomised trials are considered to have the highest rating10.

• GRADE approach indicated the three studies7-9 used in the meta-analysis are methodologically sound. (Summaries of findings tables using GRADE approach not shown on poster).

• The 867 neonates in the studies had a range of gestations from < 26 weeks to 42 weeks with most at gestations of 26 to 32 weeks (n = 520).

• A range of devices were used for HHHFNC and nCPAP: Flow rates for HHHFNC ranged from 2 to 6 l/min.

• nCPAP pressures ranged from 4 to 8 cm H2O.

• The only statistical difference found was with nasal trauma showing fewer neonates developing this problem in the HHHFNC group compared to nCPAP group which relates to smaller sized prongs with a 50% leak at the nares which is needed for high flow to be effective.

Conclusions

• This review has external validity and can be applied to neonates requiring non-invasive respiratory care and non-tertiary neonatal care units.

• The review found that HHHFNC is as effective as nCPAP at achieving similar outcomes and for 4 to 8 cm H2O in the outcomes listed in this review.

• Due to HHHFNC being a less invasive procedure, better tolerated by infants (including improved parent-infant interaction), and with significantly less nasal trauma, HHHFNC will be considered the first line option for non-invasive respiratory support in neonatal settings.

Implications for Practice and Research

• This review has shown no clinically meaningful difference between HHHFNC and nCPAP in the neonatal population.

• Treatment failure rates for neonates with 28 weeks gestation should be found to be higher in the HHHFNC group compared to nCPAP group in the Manley 2013 trial.

• Authors from the Collins and Yoder 2013 studies suggested more RCTs are needed for neonates ≥ 28 weeks gestation.

• One study (Yoder 2013) involved neonates over 32 weeks gestation. These neonates are at risk for respiratory distress syndrome, transient tachypnea of the newborn, and meconium aspiration syndrome, thus RCT’s comparing HHHFNC to nCPAP for these older neonates would be beneficial.

References


