Please find below the results of your literature search request.

If you would like the full text of any of the abstracts included, or would like a further search completed on this topic, please let us know.

We'd appreciate feedback on your satisfaction with this literature search. Please visit http://www.hello.nhs.uk/literature_search_feedback.asp and complete the form.

Thank you

Literature search results

Search completed for: High flow oxygen therapy in children with bronchiolitis. Reduction of oxygen requirements and avoidance of endotracheal intubation.

Search required by: 15th January 2015
Search completed on: 13th January 2015
Search completed by: Richard Bridgen

Search details

High flow oxygen therapy in children with bronchiolitis. Reduction of oxygen requirements and avoidance of endotracheal intubation.

Resources searched

NICE Evidence; TRIP Database; Cochrane Library; CINAHL; EMBASE; HMIC; MEDLINE; Google Scholar; Google Advanced Search

Database search terms: bronchiolitis; exp BRONCHIOLITIS; (highflow OR high-flow) adj1 (therap* OR oxygen); exp OXYGEN THERAPY; oxygen; “endotracheal intubation”; exp ENDOTRACHEAL INTUBATION; HHHF; HFT; NHFT; (reduc* OR decreas* OR lessen*) adj2 oxygen

Evidence / Google Scholar search string(s): bronchiolitis ("high-flow" oxygen) OR HHHF OR HFT OR NHFT OR HFHNO) ("reduction in oxygen" OR "decrease in oxygen" OR "endotracheal intubation") children bronchiolitis (oxygen OR HHHF OR HFT OR NHFT OR HFHNO) ("reduction in oxygen" OR "decrease in oxygen" OR "endotracheal intubation") children

Summary

There's not a huge amount on this subject Terry. A lot on the use of supplemental oxygen and the use of NIV, CPAP etc, but little on use of high-flow oxygen in terms of avoidance of endotracheal intubation, but you may find useful information in some of the more general papers I have also included.
### Guidelines and Policy

**SIGN**

Guideline 91: Bronchiolitis in children 2006

### Evidence Reviews

**Cochrane Database of Systematic Reviews**

**High-flow nasal cannula therapy for infants with bronchiolitis 2014**

There is insufficient evidence to determine the effectiveness of HFNC therapy for treating infants with bronchiolitis. The current evidence in this review is of low quality, from one small study with uncertainty about the estimates of effect and an unclear risk of performance and detection bias. The included study provides some indication that HFNC therapy is feasible and well tolerated. Further research is required to determine the role of HFNC in the management of bronchiolitis in infants. The results of the ongoing studies identified will contribute to the evidence in future updates of this review.

**High-flow nasal cannula therapy for respiratory support in children 2014**

Based on the results of this review, no evidence is available to allow determination of the safety or effectiveness of HFNC as a form of respiratory support in children.

**Heliox inhalation therapy for bronchiolitis in infants 2010**

Current evidence suggests that the addition of heliox therapy may significantly reduce a clinical score evaluating respiratory distress in the first hour after starting treatment in infants with acute RSV bronchiolitis. Nevertheless, there was no reduction in the rate of intubation, in the need for mechanical ventilation, or in the length of PICU stay. Further studies with homogeneous logistics in their heliox application are needed. Such studies would provide necessary information as to the appropriate place for heliox in the therapeutic schedule for severe bronchiolitis.

### Published Research – Databases

1. **Use of high flow nasal cannula oxygen (HFNCO) in infants with bronchiolitis on a paediatric ward: A 3-year experience**

   **Author(s)** Kallappa C., Hufton M., Millen G., Ninan T.K.

   **Citation:** Archives of Disease in Childhood: Education and Practice Edition, August 2014, vol./is. 99/8(790-791), 1743-0585;1743-0593 (01 Aug 2014)

   **Publication Date:** August 2014

   **Source:** EMBASE

   Available in fulltext from Education and Practice at Highwire Press

2. **Question 1: Is there a role for high-flow nasal cannula oxygen therapy to prevent endotracheal intubation in children with viral bronchiolitis?**

   **Author(s)** Kneyber, Martin C J

   **Citation:** Archives of Disease in Childhood, 01 December 2013, vol./is. 98/12(1018-1020), 00039888

   **Publication Date:** 01 December 2013

   **Source:** CINAHL
3. High-flow nasal cannula use in children with respiratory distress in the emergency department: Predicting the need for subsequent intubation

**Author(s)** Kelly G.S., Simon H.K., Sturm J.J.

**Citation:** Pediatric Emergency Care, August 2013, vol./is. 29/8(888-892), 0749-5161;1535-1815 (August 2013)

**Publication Date:** August 2013

**Abstract:** BACKGROUND: High-flow nasal cannula (HFNC) is a safe, well-tolerated, and noninvasive method of respiratory support that has seen increasing use in the care of children with respiratory distress. High-flow nasal cannula may be able to prevent intubations in infants and children with respiratory distress. OBJECTIVE: The objective of this study was to determine the clinical and patient characteristics that predict success or failure of HFNC therapy in children presenting to the pediatric emergency department (PED) with respiratory distress. DESIGN/METHODS: A retrospective cohort review was conducted of all children younger than 2 years evaluated in 2 PEDs between June 2011 and September 2012 who received HFNC therapy within 24 hours of initial triage. Data extraction included clinical variables, demographic variables, and patient outcomes. Therapy failure was defined as the clinical decision to intubate a patient after an antecedent trial of HFNC. Multivariable logistic regression was performed to identify factors associated with intubation following HFNC. RESULTS: Four hundred ninety-eight cases meeting criteria for inclusion were identified. The most common final diagnosis was acute bronchiolitis (n = 231, 46%), followed by pneumonia (n = 138, 28%) and asthma (n = 38, 8%). Of the 498 patients, 42 (8%) of patients failed therapy and required intubation following HFNC trial. Risk factors associated with HFNC failure were triage respiratory rate greater than 90th percentile for age (odds ratio [OR], 2.11; 95% confidence interval [CI], 1.01-4.43), initial venous PCO2 greater than 50 mm Hg (OR, 2.51; 95% CI, 1.06-5.98), and initial venous pH less than 7.30 (OR, 2.53; 95% CI, 1.12-5.74). A final diagnosis of bronchiolitis was observed to be protective with respect to intubation (OR, 0.40; 95% CI, 0.17-0.96). CONCLUSIONS: In infants with all-cause respiratory distress presenting in the PED, triage respiratory rate greater than 90th percentile for age, initial venous PCO2 greater than 50 mm Hg, and initial venous pH less than 7.30 were associated with failure of HFNC therapy. A diagnosis of acute bronchiolitis was protective with respect to intubation following HFNC. This finding may help guide clinicians who use HFNC by identifying a patient population at higher risk of failing therapy. Copyright 2013 by Lippincott Williams & Wilkins.

**Source:** EMBASE

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4. Use of nasal CPAP in infants with bronchiolitis in the south of england: A multicentre, prospective, observational study

**Author(s)** Saha A., Vamvakiti E., Linney M.

**Citation:** Archives of Disease in Childhood: Education and Practice Edition, June 2013, vol./is. 98/(A62), 1743-0585 (June 2013)

**Publication Date:** June 2013

**Abstract:** Aim Bronchiolitis is a common respiratory illness in childhood with 64 million cases of RSV bronchiolitis worldwide every year. In England, 2.8% hospital admissions in children <1 year of age are due to RSV bronchiolitis with upto 5% of these patients going on to develop respiratory failure. The Aim of this study was to review the use of nasal continuous positive airway pressure (nCPAP) in infants with bronchiolitis. A secondary aim was to identify predictive factors for CPAP failure resulting in endotracheal intubation and mechanical ventilation Methods A prospective, multicentre, observational study was undertaken from 1November 2008 to 28February 2009. Seven Paediatric Units in the South of England participated in the study. Data was collected on indications for nCPAP, respiratory rate and blood gases prior to nCPAP, total number of days on nCPAP and length of hospital stay. Results A total of 51 infants with the clinical diagnosis of
Bronchiolitis required nCPAP during the study period. The main indications were increased work of breathing (47.0%), apnoeas (39.2%) and increasing oxygen requirements (23.5%). Among them 16 were ex-preterm (31.37%). Prior to nCPAP the mean respiratory rate was 63/min (range 28 to 120), mean oxygen saturations 85% (70 to 98%), mean pH 7.25 (7.03 to 7.36) and mean PCO2 10.42 (4.36 to 19.0). The average time on nCPAP was 2.6 days (2 hours to 11 days) and the average length of hospital stay was 10.96 days (5 to 22 days).

There were no reported deaths. 11 out of the 51 infants failed trial on nCPAP requiring intubation (21.5%). The main indications were apnoeas (45.45%), CO2 retention (36.36%) and increasing work of breathing (36.36%). Subgroup analysis revealed that 7 out of the 11 infants requiring intubation were ex-preterm (63.6%) and 8 had significant PCO2 rise (>8) prior to the trial of nCPAP (72.72%). Conclusions nCPAP has a good success rate in bronchiolitis. In our study, predictive factors associated with nCPAP failure were prematurity and high CO2 retention prior to trial of nCPAP. The authors recommend the availability of nCPAP facilities in all paediatric units and appropriate training of medical and nursing staff in its optimal use.

Source: EMBASE

Available in fulltext from Education and Practice at Highwire Press

Available in fulltext from Archives of Disease in Childhood -- Education & Practice Edition at EBSCOhost

5. High flow nasal prong oxygen reduces the need for mechanical ventilation in bronchiolitic infants

Author(s) Mayfield S., Hough J., Pham T., Schibler A.

Citation: Pediatric Critical Care Medicine, May 2011, vol./is. 12/3 SUPPL. 1(A118), 1529-7535 (May 2011)

Publication Date: May 2011

Abstract: Objectives: This retrospective study aimed to report the use of high flow nasal prong (HFNP) oxygen in bronchiolitic infants aged <24 months. Viral bronchiolitis is the most common cause for non-elective admission to PICU. HFNP provides respiratory support by delivering humidified oxygen via nasal cannula using flow rates up to 2L/kg/min. Methods: A database review of infants receiving HFNP on admission during the period 2005-2009. was performed to examine the escalation of respiratory support from HFNP to non-invasive ventilation (NIV) or invasive ventilation (INV) in a 19 bed PICU/CICU with 1100 admissions/year. Confounding factors such as age and paediatric index of mortality (PIM2) were investigated to determine further risk factors. Linear mixed models were applied to discriminate infants needing HFNP only or other respiratory support (NIV or INV). Results: HFNP usage in our PICU increased from 13% in 2005 to 66% in 2009. In comparison, the rate of invasive ventilation reduced from 37% in 2005 to 7% in 2009. The reported intubation rate in Australia and New Zealand in 2008 was 28% (ANZPIC Registry). PIM2 score was a risk factor for escalation to NIV: HFNP only 0.17 (95% CI 0.16-0.23) vs. NIV 0.70 (0.59-0.87), p<0.001. A 20% decrease in heart and respiratory rate within 90 minutes after initiation of HFNP therapy was predictive for successful HFNP only therapy (p<0.05). Conclusion: An increase in HFNP usage in our PICU over the last 5 years has corresponded with a reduction in the rate of intubation for infants aged <24 months with bronchiolitis.

Source: EMBASE

Available in fulltext at Pediatric Critical Care Medicine; Collection notes: Academic-License. Please when asked to pick an institution please pick NHS

Available in fulltext at Pediatric Critical Care Medicine; Collection notes: Academic-License. Please when asked to pick an institution please pick NHS

Available in fulltext at Pediatric Critical Care Medicine; Collection notes: Academic-License. Please when asked to pick an institution please pick NHS

6. Nasal continuous positive airway pressure use in severe acute bronchiolitis to avoid mechanical ventilation in infants
Abstract: Objective: Usefulness of nasal continuous positive airway pressure (NCPAP) in severe acute bronchiolitis has been checked. The objective of this retrospective descriptive study was to evaluate the use of nasal CPAP in infants with severe acute bronchiolitis in our PICU. Methods: Forty-two infants were hospitalized in our PICU during the 2 epidemics (2007-2008, 2008-2009). Among them, 30 patients needed a respiratory support by NCPAP, out of those only six infants needed intubation and mechanical ventilation. Results: General characteristics were similar during the 2 periods. Percentage of NCPAP failure, defined by tracheal intubation requirement during the stay in PICU, was similar during the 2 periods (20%), but number of NCPAP increased. We observed a significant decrease in respiratory rate, heart rate, oxygen requirement and PaCO2 during NCPAP. Initial PaCO2 and hypoxia was a predictive of NCPAP failure. Duration of respiratory support and stay were reduced in the NCPAP group. There were no complications or death in both groups. Conclusion: NCPAP appears to be a safe alternative to immediate intubation in infants with severe bronchiolitis.

Source: EMBASE

Available in fulltext at Pediatric Critical Care Medicine; Collection notes: Academic-License.

7. Heliox inhalation therapy for bronchiolitis in infants

Author(s) Liet J.M., Ducruet T., Gupta V., Cambonie G.

Citation: Cochrane database of systematic reviews (Online), 2010, vol./is. 4/(CD006915), 1469-493X (2010)

Publication Date: 2010

Abstract: BACKGROUND: Acute viral bronchiolitis is associated with airway obstruction and turbulent gas flow. Heliox, a mixture of oxygen and the inert gas helium, may improve gas flow through high-resistance airways and decrease the work of breathing. OBJECTIVES: To assess heliox in addition to standard medical care for acute bronchiolitis in infants. SEARCH STRATEGY: We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2009, issue 2), which includes the Cochrane Acute Respiratory Infections (ARI) Group's Specialised Register, MEDLINE (1966 to June 2009), EMBASE (June 2009), LILACS (May 2009) and the NIH web site (May 2009). SELECTION CRITERIA: Randomised controlled trials (RCTs) and quasi-RCTs of heliox in infants with acute bronchiolitis. DATA COLLECTION AND ANALYSIS: Two review authors independently extracted data and assessed trial quality. We pooled data from individual trials. MAIN RESULTS: We included four trials involving 84 infants under two years of age with respiratory distress secondary to bronchiolitis caused by respiratory syncytial virus (RSV) and requiring paediatric intensive care unit (PICU) hospitalisation. We found that infants treated with heliox inhalation had a significantly lower mean clinical respiratory score in the first hour after starting treatment when compared to those treated with air or oxygen inhalation (mean difference (MD) -1.15, 95% confidence interval (CI) -1.98 to -0.33, P = 0.006, n = 69). There was no clinically significant reduction in the rate of intubation (risk ratio (RR) 1.38, 95% CI 0.41 to 4.56, P = 0.60, n = 58), in the need for mechanical ventilation (RR 1.11, 95% CI 0.36 to 3.38, P = 0.86, n = 58), or in the length of stay in a PICU (MD = -0.15 days, 95% CI -0.92 to 0.61, P = 0.69, n = 58). No adverse events related to heliox inhalation were reported. AUTHORS' CONCLUSIONS: Current evidence suggests that the addition of heliox therapy may significantly reduce a clinical score evaluating respiratory distress in the first hour after starting treatment in infants with acute RSV bronchiolitis. Nevertheless, there was no reduction in the rate of intubation, in
the need for mechanical ventilation, or in the length of PICU stay. Further studies with homogeneous logistics in their heliox application are needed. Such studies would provide necessary information as to the appropriate place for heliox in the therapeutic schedule for severe bronchiolitis.

**Source:** EMBASE

Available in fulltext from Cochrane Library, The at Wiley

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**Google Scholar**

*From the 1st fifty results:*

**High Flow Nasal Cannulae Therapy in Infants with Bronchiolitis**

M Pennica, TI Pediatrica, AOU Meyer - researchgate.net
... oxygen blends has gained favor as a way to decrease work of breathing and prevent **endotracheal intubation** in children with ... Parke 2011 Respiratory Care The effects of flow on airway pressure during Nasal **High Flow oxygen therapy**. ... HFNC in children with bronchiolitis ... Cite Save

**Neonatal noninvasive ventilation techniques: do we really need to intubate?**

RM DiBlasi - Respiratory care, 2011 - rc.rcjournal.com
... positive airway pressure (CPAP). Nearly half of all neonates who are supported with CPAP will still develop respiratory failure that requires potentially injurious **endotracheal intubation** and invasive ventilation. Thus, the role ... Cited by 26 Related articles All 6 versions Cite Save

**Use of high-flow nasal cannula support in the emergency department reduces the need for intubation in pediatric acute respiratory insufficiency**

R Wing, C James, LS Maranda… - Pediatric emergency …. 2012 - journals.lww.com
... 2 With pneumonia, asthma, and bronchiolitis comprising nearly 11% of pediatric ED (PED) visits and 25% of pediatric ... Traditional therapeutic options for ARI and ARF include **endotracheal intubation** with mechanical ventilation and noninvasive ventilation (NIV) with either ... Cited by 15 Related articles All 5 versions Cite Save

**What's new on NIV in the PICU: does everyone in respiratory failure require endotracheal intubation?**

AC Argent, P Biban - Intensive care medicine, 2014 - Springer
... Child Health, University of Cape Town and Red Cross War Memorial Children's Hospital, Klipfontein ... and ARDS [2]; patients with terminal conditions or following refusal of **endotracheal intubation** [3]; in ... is evidence that the increased use of nasal CPAP in bronchiolitis has been ... Cited by 2 Related articles All 3 versions Cite Save

**Use of continuous positive airway pressure (CPAP) in acute viral bronchiolitis: a systematic review**

M Donlan, PS Fontela, PS Puligandla - Pediatric pulmonology, 2011 - Wiley Online Library
... Due to the growing popularity of CPAP, with or without the use of heliox, in children with bronchiolitis, we performed a systematic review to assess its impact on respiratory distress, CO 2 retention and the need for **endotracheal intubation**. ... Cited by 31 Related articles All 4 versions Cite Save

**The Cochrane library and the treatment of bronchiolitis in children: an overview of**
Bronchiolitis describes a viral inflammation of the bronchioles in the lower respiratory tract that... Epinephrine for bronchiolitis (in press), 17. Inpatient and outpatient, Bronchiolitis: first episode of... of cardiogenic causes), CNEP with or without assisted PPV or Ni CPAP without assisted...

Cited by 20 Related articles All 3 versions Cite Save Saved More

High Flow Nasal Prong Oxygen Therapy or Nasopharyngeal Continuous Positive Airway Pressure for Children With Moderate-to-Severe Respiratory Distress?*

F ten Brink, T Duke, J Evans - Pediatric Critical Care Medicine, 2013 - journals.lww.com

... High flow was defined as 2 L/kg/min, using appropriate nasal prongs, a humidifier... coding criteria (9). We classified patients into eight broad categories: bronchiolitis; pneumonia; respiratory... HR reduction by 20% or to within normal range, and inspired oxygen fraction reduced to...

Cited by 6 Related articles All 3 versions Cite Save Saved More

Recent evidence on the management of bronchiolitis

AR Schroeder, JM Mansbach - Current opinion in pediatrics, 2014 - journals.lww.com

... Although there is significant variability in testing and treatment of children with bronchiolitis, diagnostic testing rarely improves care, and no currently available pharmacologic options have been proven to provide meaningful benefits or improve outcomes. Recent findings...

Cited by 3 Related articles All 5 versions Cite Save Saved More

Published Research – Database Search Strategy

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