Treff fra søk til fagprosedyre

high flow hos barn og unge

Retningslinjesøk i PubMed

Leone M, Einav S, Chiumello D, Constantin JM, De Robertis E, De Abreu MG, et al. **Noninvasive respiratory support in the hypoxaemic peri-operative/periprocedural patient: a joint ESA/ESICM guideline**. Intensive Care Med. 2020;46(4):697-713. http://dx.doi.org/10.1007/s00134-020-05948-0
Hypoxaemia is a potential life-threatening yet common complication in the peri-operative and periprocedural patient (e.g. during an invasive procedure at risk of deterioration of gas exchange, such as bronchoscopy). The European Society of Anaesthesiology (ESA) and the European Society of Intensive Care Medicine (ESICM) developed guidelines for the use of noninvasive respiratory support techniques in the hypoxaemic patient in the peri-operative and periprocedural period. The panel outlined five clinical questions regarding treatment with noninvasive respiratory support techniques [conventional oxygen therapy (COT), high flow nasal cannula, noninvasive positive pressure ventilation (NIPPV) and continuous positive airway pressure (CPAP)] for hypoxaemic patients with acute peri-operative/periprocedural respiratory failure. The goal was to assess the available literature on the various noninvasive respiratory support techniques, specifically studies that included adult participants with hypoxaemia in the peri-operative/periprocedural period. The literature search strategy was developed by a Cochrane Anaesthesia and Intensive Care trial search specialist in close collaboration with the panel members and the ESA group methodologist. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system was used to assess the level of evidence and to grade recommendations. The final process was then validated by both ESA and ESICM scientific committees. Among 19 recommendations, the two grade 1B recommendations state that: in the peri-operative/periprocedural hypoxaemic patient, the use of either NIPPV or CPAP (based on local expertise) is preferred to COT for improvement of oxygenation; and that the panel suggests using NIPPV or CPAP immediately post-extubation for hypoxaemic patients at risk of developing acute respiratory failure after abdominal surgery.
https://link.springer.com/article/10.1007/s00134-020-05948-0

Riese J, Porter T, Fierce J, Riese A, Richardson T, Alverson BK. **Clinical Outcomes of Bronchiolitis After Implementation of a General Ward High Flow Nasal Cannula Guideline**. Hosp Pediatr. 2017;7(4):197-203. http://dx.doi.org/10.1542/hpeds.2016-0195
OBJECTIVE: The goal of this study was to assess the association of the introduction of a ward's high-flow nasal cannula (HFNC) guideline with clinical outcomes of infants with bronchiolitis. METHODS: We conducted a retrospective, pre-post intervention study with an interrupted time series analysis of infants admitted with bronchiolitis between 2010 and 2014 at an urban, tertiary care children's hospital. Patients admitted in the 24 months before and after initiation of a guideline for HFNC use on the general wards were compared. The primary outcome was length of hospital stay. Secondary outcomes were PICU transfer rate and length of stay, intubation rate, and 30-day readmission, adjusted for season. RESULTS: A total of 1937 patients met inclusion criteria; 936 were admitted before and 1001 admitted after the introduction of HFNC use on the general wards. Comparing the 2 groups, the hospital-wide rate of HFNC use in bronchiolitis treatment increased after HFNC became available on the wards (23.9% vs 35.2%; P < .001). The ward's HFNC guideline was not associated with a change in preintervention trajectory of total hospital length of stay (P = .48), PICU length of stay (P = .06), or rate of PICU transfer (P = .97). There was also no difference in intubation rate or 30-day readmission between the 2 groups. CONCLUSIONS: Initiating a guideline for HFNC use on the general pediatric wards was associated with an increase in the use of the intervention with no significant change in total hospital length of stay, PICU length of stay and transfer rate, intubation rate, or 30-day readmission for patients with bronchiolitis.
https://hosppeds.aappublications.org/content/7/4/197.long

Systematiske oversikter - Cochrane Library

Wilkinson D, Andersen C, O'Donnell CPF, De Paoli AG, Manley BJ. **High flow nasal cannula for respiratory support in preterm infants.** Cochrane Database Syst Rev. 2016(2). http://dx.doi.org/10.1002/14651858.CD006405.pub3

Goel D, Oei JL, Smyth J, Schindler T. **Diaphragm-triggered non-invasive respiratory support in preterm infants.** Cochrane

Treff fra søk til fagprosedyre

Database Syst Rev. 2020(3). http://dx.doi.org/10.1002/14651858.CD012935.pub2
- Background Diaphragm-triggered non-invasive respiratory support, commonly referred to as NIV-NAVA (non-invasive neurally adjusted ventilatory assist), uses the electrical activity of the crural diaphragm to trigger the start and end of a breath. It provides variable inspiratory pressure that is proportional to an infant's changing inspiratory effort. NIV-NAVA has the potential to provide effective, non-invasive, synchronised, multilevel support and may reduce the need for invasive ventilation; however, its effects on short- and long-term outcomes, especially in the preterm infant, are unclear. Objectives To assess the effectiveness and safety of diaphragm-triggered non-invasive respiratory support in preterm infants (< 37 weeks' gestation) when compared to other non-invasive modes of respiratory support (nasal intermittent positive pressure ventilation (NIPPV); nasal continuous positive airway pressure (nCPAP); high-flow nasal cannulae (HFNC)), and to assess preterm infants with birth weight less than 1000 grams or less than 28 weeks' corrected gestation at the time of intervention as a sub-group. Search methods We used the standard search strategy of Cochrane Neonatal to search the Cochrane Central Register of Controlled Trials (CENTRAL 2019, Issue 5), MEDLINE via PubMed (1946 to 10 May 2019), Embase (1947 to 10 May 2019), and CINAHL (1982 to 10 May 2019). We also searched clinical trials databases, conference proceedings, and the reference lists of retrieved articles for randomised controlled trials (RCTs) and quasi-randomised trials. Selection criteria Randomised and quasi-randomised controlled trials that compared diaphragm-triggered non-invasive versus other non-invasive respiratory support in preterm infants. Data collection and analysis Two review authors independently selected trials, assessed trial quality and extracted data from included studies. We performed fixed-effect analyses and expressed treatment effects as mean difference (MD), risk ratio (RR), and risk difference (RD) with 95% confidence intervals (CIs). We used the generic inverse variance method to analyse specific outcomes for cross-over trials. We used the GRADE approach to assess the certainty of evidence. Main results There were two small randomised controlled trials including a total of 23 infants eligible for inclusion in the review. Only one trial involving 16 infants included in the analysis reported on either of the primary outcomes of the review. This found no difference in failure of modality between NIV-NAVA and NIPPV (RR 0.33, 95% CI 0.02 to 7.14; RD −0.13, 95% CI -0.41 to 0.16; 1 study, 16 infants; heterogeneity not applicable). Both trials reported on secondary outcomes of the review, specific for cross-over trials (total 22 infants; 1 excluded due to failure of initial modality). One study involving seven infants reported a significant reduction in maximum FiO_2 with NIV-NAVA compared to NIPPV (MD −4.29, 95% CI −5.47 to −3.11; heterogeneity not applicable). There was no difference in maximum electric activity of the diaphragm (Edi) signal between modalities (MD −1.75, 95% CI −3.75 to 0.26; I^2 = 0%) and a significant increase in respiratory rate with NIV-NAVA compared to NIPPV (MD 7.22, 95% CI 0.21 to 14.22; I^2 = 72%) on a meta-analysis of two studies involving a total of 22 infants. The included studies did not report on other outcomes of interest. Authors' conclusions Due to limited data and very low certainty evidence, we were unable to determine if diaphragm-triggered non-invasive respiratory support is effective or safe in preventing respiratory failure in preterm infants. Large, adequately powered randomised controlled trials are needed to determine if diaphragm-triggered non-invasive respiratory support in preterm infants is effective or safe. Plain language summary Diaphragm-triggered non-invasive respiratory support for preventing respiratory failure in preterm infants Review question In preterm infants, does diaphragm-triggered non-invasive respiratory support compared with other modes of non-invasive respiratory support prevent respiratory failure? Background Diaphragm-triggered non-invasive respiratory support uses the electrical signal from the breathing muscles to guide when an infant is trying to breathe. This gives infants support that is both timed with their breathing efforts and in proportion to how hard they are working to breathe. It has the potential to help infants avoid invasive breathing support with a breathing tube. It is currently unclear whether there is a beneficial effect on outcomes for preterm infants. Study characteristics We found 15 studies that assessed the effect of diaphragm-triggered non-invasive respiratory support in infants through searches of medical databases up to 10 May 2019. Of these 15, two studies (involving a total of 23 preterm infants) were eligible for inclusion in the review. Ten studies were either awaiting publication or are ongoing. Key results There is limited data from randomised controlled trials to determine the effect of diaphragm-triggered non-invasive respiratory support on important outcomes. We were able to include only two small randomised controlled trials in the review. Both studies involved infants switching from one type of support to the other and were focused on short-term changes in breathing patterns. Quality of evidence We were not able to make any meaningful conclusions in this review due to limited data and very low quality evidence. Large, high-quality studies are needed to determine whether diaphragm-triggered non-invasive respiratory support can prevent respiratory failure.

Treff uten avgresning til barn/unge:

How does a high-flow nasal cannula compare with low-flow oxygen for adults in intensive care requiring respiratory support? Clinical answer 2017
https://www.cochranelibrary.com/cca/doi/10.1002/cca.1837/full

Kopsaftis Z, Carson-Chahhoud KV, Austin MA, Wood-Baker R. **Oxygen therapy in the pre-hospital setting for acute exacerbations of chronic obstructive pulmonary disease**. Cochrane Database Syst Rev. 2020(1).
http://dx.doi.org/10.1002/14651858.CD005534.pub3

Treff fra søk til fagprosedyre

Corley A, Rickard CM, Aitken LM, Johnston A, Barnett A, Fraser JF, et al. **High-flow nasal cannulae for respiratory support in adult intensive care patients.** Cochrane Database Syst Rev. 2017(5).
http://dx.doi.org/10.1002/14651858.CD010172.pub2

Epistemonikos

Moreel L, Proesmans M. **High flow nasal cannula as respiratory support in treating infant bronchiolitis: a systematic review.** Eur J Pediatr. 2020.
http://dx.doi.org/10.1007/s00431-020-03637-0
http://www.epistemonikos.org/documents/0c5fc251e44706ab1ab25edc71501db71ef4253f

Bronchiolitis is a common respiratory illness in early childhood, often leading to hospitalization and associated healthcare costs. Low flow 100% oxygen through nasal prongs is the standard therapy for infants with bronchiolitis and hypoxemia. Nasal continuous positive airway pressure (nCPAP) or invasive ventilation is used in case of progressive respiratory failure. High flow heated and humidified oxygen therapy with delivery of an air-oxygen mixture up to 2 L/min/kg body weight via nasal prongs (referred to as high flow nasal cannula or HFNC) is a newer method for respiratory support. Initial data from retrospective studies were promising but should be interpreted with caution. A limited number of prospective randomized controlled trials (RCT) have now compared HFNC with either standard oxygen therapy (SOT) or nCPAP. In this review, we critically summarize the data from these RCTs with the aim to provide advice on how to position HFNC in clinical practice.Conclusion: HFNC is a safe mode of respiratory support that can be positioned between SOT and nCPAP as rescue therapy for children not adequately supported by SOT. It does not seem to shorten the duration of oxygen need nor the duration of hospital admission.What is Known:• HFNC is being used increasingly in the context of infant bronchiolitis. However, evidence on efficacy and safety are limited. Different published studies involve different disease severities and different pediatric settings.What is New:• In this review, we summarize data only from prospective RCTs with the aim to provide guidance on how to use HFNC.

Hong H, Li XX, Li J, Zhang ZQ. **High-flow nasal cannula versus nasal continuous positive airway pressure for respiratory support in preterm infants: a meta-analysis of randomized controlled trials.** The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians. 2019:1-231.
http://dx.doi.org/10.1080/14767058.2019.1606193
http://www.epistemonikos.org/documents/3f344884f906108d23dcceeee078ea65564a9feb

BACKGROUND: As a noninvasive respiratory support mode, high flow nasal cannula (HFNC) is widely used in preterm infants at neonatal care units. HFNC is often used as an alternative to nasal continuous positive airway pressure (NCPAP) for initial or postextubation respiratory support. The purpose of this meta-analysis is to evaluate and compare the efficacy and safety of HFNC and NCPAP for respiratory support in preterm infants. METHODS: We searched PubMed, Web of Science, Embase, Cochrane Library, Clinicaltrials.gov, Controlled-trials.com, Google Scholar, VIP, and Wang Fang for articles from their inception to December 2018. All published randomized controlled trials (RCTs) evaluating and comparing the effects of HFNC and NCPAP therapy for primary respiratory support in newborns were included. All meta-analyses were performed using Review Manager 5.3. RESULTS: In total, 21 RCTs involving 2886 preterm infants were included. The results of the meta-analysis revealed the following: 1) for primary respiratory support, the rates of treatment failure at trial entry were similar between HFNC and CPAP (relative risk 1.03, 95% confidence interval 0.79-1.33), and HFNC had reduced nasal trauma ($p < 0.00001$); and 2) for respiratory support after extubation, CPAP was associated with a lower likelihood of treatment failure than HFNC (relative risk 1.23, 95% confidence interval 1.01-1.50). The incidences of nasal trauma and pneumothorax in the HFNC group were significantly lower than that in the CPAP group ($p < 0.0001$ and $p = 0.03$). Serious adverse events did not significantly differ. CONCLUSIONS: HFNC had effects similar to those of CPAP regarding the failure of initial respiratory support in premature infants and was associated with reduced nasal trauma compared to CPAP. Following extubation, CPAP had fewer treatment failures than HFNC, but CPAP had a significantly increased rate of nasal trauma and pneumothorax. Further studies are needed to clarify the potential benefits of HFNC as primary respiratory support in extremely low birth weight or extremely preterm infants.

Mikalsen IB, Davis P, Øymar K. **High flow nasal cannula in children: a literature review**. Scand J Trauma Resusc Emerg Med. 2016;24(1):93.
http://dx.doi.org/10.1186/s13049-016-0278-4
http://www.epistemonikos.org/documents/f329b2f85cd608d46e2dbead9e637886bac3e6e3

Treff fra søk til fagprosedyre

High flow nasal cannula (HFNC) is a relatively new non-invasive ventilation therapy that seems to be well tolerated in children. Recently a marked increase in the use of HFNC has been seen both in paediatric and adult care settings. The aim of this study was to review the current knowledge of HFNC regarding mechanisms of action, safety, clinical effects and tolerance in children beyond the newborn period.We performed a systematic search of the databases PubMed, Medline, EMBASE and Cochrane up to 12th of May 2016. Twenty-six clinical studies including children on HFNC beyond the newborn period with various respiratory diseases hospitalised in an emergency department, paediatric intensive care unit or general ward were included. Five of these studies were interventional studies and 21 were observational studies. Thirteen studies included only children with bronchiolitis, while the other studies included children with various respiratory conditions. Studies including infants hospitalised in a neonatal ward, or adults over 18 years of age, as well as expert reviews, were not systematically evaluated, but discussed if appropriate.The available studies suggest that HFNC is a relatively safe, well-tolerated and feasible method for delivering oxygen to children with few adverse events having been reported. Different mechanisms including washout of nasopharyngeal dead space, increased pulmonary compliance and some degree of distending airway pressure may be responsible for the effect. A positive clinical effect on various respiratory parameters has been observed and studies suggest that HFNC may reduce the work of breathing. Studies including children beyond the newborn period have found that HFNC may reduce the need of continuous positive airway pressure (CPAP) and invasive ventilation, but these studies are observational and have a low level of evidence. There are no international guidelines regarding flow rates and the optimal maximal flow for HFNC is not known, but few studies have used a flow rate higher than 10 L/min for infants.Until more evidence from randomized studies is available, HFNC may be used as a supplementary form of respiratory support in children, but with a critical approach regarding effect and safety, particularly when operated outside of a paediatric intensive care unit.

Hodgson KA, Manley BJ, Davis PG. **Is Nasal High Flow Inferior to Continuous Positive Airway Pressure for Neonates?** Clin Perinatol. 2019;46(3):537-51. http://dx.doi.org/http://dx.doi.org/10.1016/j.clp.2019.05.005
http://www.elsevier.com/inca/publications/store/6/2/3/3/2/4/index.htt

Nasal high-flow therapy (nHF) is increasingly used for neonates, with perceived benefits including reduced rates of nasal trauma and parent and nursing staff preference. Current evidence suggests that although nHF is a reasonable alternative for postextubation support of preterm infants, continuous positive airway pressure is a superior modality for primary support of respiratory distress syndrome. Minimal evidence exists for use of nHF in extremely preterm infants less than 28 weeks' gestation. Depending on clinician preference, units may still choose nHF in some settings, although careful choice of appropriate patients, and availability of rescue continuous positive airway pressure, is essential.

Hodgson KA, Davis PG, Owen LS. **Nasal high flow therapy for neonates: Current evidence and future directions.** J Paediatr Child Health. 2019;55(3):285-90. http://dx.doi.org/http://dx.doi.org/10.1111/jpc.14374
http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1440-1754

Nasal high flow (nHF) therapy is a commonly used method of providing non-invasive respiratory support for neonates. It has several potential mechanisms of action: continuous distending pressure, nasopharyngeal dead space washout, provision of heated and humidified gases and reduction of work of breathing. nHF is used in a number of clinical scenarios for preterm and term infants, including primary respiratory and post-extubation support. In recent years, large trials have generated evidence pertinent to these indications. Novel applications for nHF in neonates warrant further research: during endotracheal intubation, for initial delivery room stabilisation of preterm infants and in conjunction with minimally invasive surfactant therapy.

Haidar Shehadeh AM. **Non-invasive high flow oscillatory ventilation in comparison with nasal continuous positive pressure ventilation for respiratory distress syndrome, a literature review.** Journal of Maternal Fetal and Neonatal Medicine. 2019. http://dx.doi.org/http://dx.doi.org/10.1080/14767058.2019.1671332
https://www.tandfonline.com/loi/ijmf20

Background: Noninvasive high-frequency oscillatory ventilation (NHFOV) keeps the lung open with add-on effective rhythmic oscillations in addition to allowing spontaneous breathing. This review aims at reconstructing the different pieces of available research articles and evidence into a more solid collective evidence for NHFOV in preterm infants with respiratory distress syndrome (RDS). Method(s): A thorough systemic search was conducted in Medline, Embase, Web of Science, Google Scholar, CINAHL, and Cochrane. Randomized controlled trials (RCTs) on preterm infants with RDS comparing NHFOV with nasal continuous positive airway pressure (NCPAP) in terms of PCO<inf>2</inf> change, need for ventilation, duration of respiratory support, mortality air leak, or BPD were included. Data quality assessment and meta-analyses were carried out. Result(s): Five RCTs involving 270 preterm infants included in the review.

PCO<inf>2</inf> relatively decreased on NHFOV (MD = 3.84, confidence interval (CI) 7.32-0.35, p =.03). On the other hand, relative risk (RR) of intubation was unquestionably decreased with NHFOV in comparison with NCPAP (RR = 0.43, CI 0.25-0.75, p =.003) without statistical heterogeneity I² = 0%. Although the risk of mortality was less in NHFOV, the difference was statistically insignificant (RR = 0.72, CI 0.24-2.18, p =.56). Other outcomes reported in single studies only. Duration of respiratory support was significantly shorter in NHFOV compared with NCPAP (37.35 +/- 8.96 versus 49.77 +/- 10.33, p =.009), whereas air leak and BPD were reported in very few cases without a significant difference between the two interventions. Conclusion(s): NHFOV improved the PCO<inf>2</inf> elimination and decreased the risk of intubation without a significant change in mortality compared with NCPAP. Copyright © 2019, © 2019 Informa UK Limited, trading as Taylor & Francis Group.

Fleeman N, Dundar Y, Shah PS, Shaw BNJ. **Heated Humidified High-Flow Nasal Cannula for Preterm Infants: An Updated Systematic Review and Meta-analysis**. Int J Technol Assess Health Care. 2019;35(4):298-306.
http://dx.doi.org/http://dx.doi.org/10.1017/S0266462319000424
http://journals.cambridge.org/action/displayJournal?jid=THC

Background Heated humidified high-flow nasal cannula (HHHFNC) is gaining popularity as a mode of respiratory support. We updated a systematic review and meta-analyses examining the efficacy and safety of HHHFNC compared with standard treatments for preterm infants. The primary outcome was the need for reintubation for preterm infants following mechanical ventilation (post-extubation analysis) or need for intubation for preterm infants not previously intubated (analysis of primary respiratory support)Methods We searched PubMed, MEDLINE, Embase, and the Cochrane Library for randomized controlled trials (RCTs) of HHHFNC versus standard treatments. Meta-analysis was conducted using Review Manager 5.3.Results The post-extubation analysis included ten RCTs (n = 1,201), and the analysis of primary respiratory support included ten RCTs (n = 1,676). There were no statistically significant differences for outcomes measuring efficacy, including the primary outcome. There were statistically significant differences favoring HHHFNC versus nasal cannula positive airway pressure (NCPAP) for air leak (post-extubation, risk ratio [RR] 0.29, 95 percent confidence interval [CI] 0.11 to 0.76, I2 = 0) and nasal trauma (post-extubation: 0.35, 95 percent CI 0.27 to 0.46, I2 = 5 percent; primary respiratory support: RR 0.52, 95 percent CI 0.37 to 0.74; I2 = 27 percent). Studies, particularly those of primary respiratory support, included very few preterm infants with gestational age (GA) <28 weeks.Conclusions HHHFNC may offer an efficacious and safe alternative to NCPAP for some infants but evidence is lacking for preterm infants with GA <=28 weeks. Copyright © 2019 Cambridge University Press.

Carlo WA, Vento M. **Oxygen Therapy for Preterm Infants.** Clin Perinatol. 2019;46(3):xvii-xviii.
http://dx.doi.org/http://dx.doi.org/10.1016/j.clp.2019.06.001
http://www.elsevier.com/inca/publications/store/6/2/3/3/2/4/index.htt

Embase:

Med flow rate:

Morris L, Cook N, Ramsey A, Alacapa JV, Smith LE, Gray C, et al. **Weaning Humidified High Flow Oxygen Therapy among Paediatric Patients: An Integrative Review of Literature**. J Pediatr Nurs. 2020;50:37-45.
http://dx.doi.org/http://dx.doi.org/10.1016/j.pedn.2019.10.015

PROBLEM: The paucity of up-to-date recommendations and evidence-based models, whether it is physician-initiated or initiated by other healthcare professionals, for humidified high flow oxygen therapy among children. ELIGIBILITY CRITERIA: The inclusion criteria included the following: 1) use of high flow oxygen therapy (>=15 L/min); 2) published studies from the year 2000 and onwards; 3) research article in a peer-reviewed journal; 4) studies conducted in a hospital setting involving paediatric patients <18years old; 5) availability of full article online. SAMPLE: From March to April 2018, electronic databases such as PubMed, Cumulative Index of Nursing and Allied Health Literature, Excerpta Medica Database, Cochrane Library, Joanna Briggs Institute Library of Systematic Reviews, SCOPUS, Ovid, Informit, and Google Scholar were accessed. The systematic search initially yielded 41 studies. RESULT(S): Eventually, three eligible studies were reviewed and appraised. Overarching themes were identified: 1) the lack of weaning standards; 2) the limited focus on young population in intensive care settings; and 3) the paucity of weaning models. CONCLUSION(S): The lack of studies suggested that this is a fertile area for research. In this light, this paper challenged researchers, clinicians, and experts to develop evidence-based standards and models of weaning towards efficient and better quality of care. IMPLICATION: This review may lead to the development of nurse-led or nurse-initiated weaning protocols to enable timely weaning intervention for children and thus reduce the need for prolonged oxygen use. Furthermore, this may also instigate an

economic evaluation of a nurse-lead weaning against current models of medically lead weaning.

Moreel L, Proesmans M. **High flow nasal cannula as respiratory support in treating infant bronchiolitis: a systematic review**. European Journal of Pediatrics. 2020. http://dx.doi.org/http://dx.doi.org/10.1007/s00431-020-03637-0
https://rd.springer.com/journal/431

Bronchiolitis is a common respiratory illness in early childhood, often leading to hospitalization and associated healthcare costs. Low flow 100% oxygen through nasal prongs is the standard therapy for infants with bronchiolitis and hypoxemia. Nasal continuous positive airway pressure (nCPAP) or invasive ventilation is used in case of progressive respiratory failure. High flow heated and humidified oxygen therapy with delivery of an air-oxygen mixture up to 2 L/min/kg body weight via nasal prongs (referred to as high flow nasal cannula or HFNC) is a newer method for respiratory support. Initial data from retrospective studies were promising but should be interpreted with caution. A limited number of prospective randomized controlled trials (RCT) have now compared HFNC with either standard oxygen therapy (SOT) or nCPAP. In this review, we critically summarize the data from these RCTs with the aim to provide advice on how to position HFNC in clinical practice. Conclusion(s): HFNC is a safe mode of respiratory support that can be positioned between SOT and nCPAP as rescue therapy for children not adequately supported by SOT. It does not seem to shorten the duration of oxygen need nor the duration of hospital admission.What is Known:* HFNC is being used increasingly in the context of infant bronchiolitis. However, evidence on efficacy and safety are limited. Different published studies involve different disease severities and different pediatric settings.What is New:* In this review, we summarize data only from prospective RCTs with the aim to provide guidance on how to use HFNC.

Jain D, Bancalari E. New **Developments in Respiratory Support for Preterm Infants**. Am J Perinatol. 2019;36(Supplement 2):S13-S7.
http://dx.doi.org/http://dx.doi.org/10.1055/s-0039-1691817
https://www.thieme.de/de/american-journal-perinatology/journal-information-9405.htm

The evolution of neonatal respiratory support has been one of the cornerstones for the advancements in neonatal-perinatal medicine, allowing survival of infants previously considered not viable. There is an increasing focus on developing strategies which are not only lifesaving but also minimize lung and other organ systems injury, thereby reducing long-term morbidities. Respiratory support immediately after birth is an area that had lagged behind in terms of evidence base and technological advancements until recently. Some of these advancements include use of a respiratory function monitors for measuring flow and tidal volume, new evidence for oxygen supplementation and monitoring, and the efforts to formulate an ideal strategy for establishing functional residual capacity after birth. Increasing evidence for the benefits of avoiding invasive ventilation on reduction of bronchopulmonary dysplasia has resulted in efforts to further reduce the need for endotracheal intubation by applying newer strategies such as less invasive surfactant instillation, noninvasive high-frequency oscillatory ventilation, or use of high flow nasal cannula oxygen. For infants requiring mechanical ventilation, newer strategies such as volume targeted ventilation or neurally adjusted ventilation are being evaluated to reduce ventilator induced lung injury. Despite these advances, there are significant challenges, including lack of conclusive evidence base for many of currently used respiratory strategies, no reduction in the incidence of bronchopulmonary dysplasia in the last decade, and difficulties in defining outcome measures that better reflect long-term respiratory health.

Dugernier J, Reychler G, Vecellio L, Ehrmann S. **Nasal High-Flow Nebulization for Lung Drug Delivery: Theoretical, Experimental, and Clinical Application.** J Aerosol Med Pulm Drug Deliv. 2019;32(6):341-51.
http://dx.doi.org/http://dx.doi.org/10.1089/jamp.2019.1524
http://www.liebertonline.com/loi/jamp

The use of nasal high-flow (NHF) therapy is rapidly spreading across acute care facilities. This raises the question of optimal delivery of inhaled medication to patients undergoing this noninvasive ventilatory support consisting in delivering heated and humidified high gas flow rates through nasal cannulas. In this article, we review experimental and clinical work evaluating the delivery of inhaled medication within the NHF circuit to target the lung without interrupting the ventilatory support. Using vibrating mesh nebulizers placed immediately upstream or downstream of the humidification chamber, with flow rates of 30-45 L/min in adults and 2-6 L/min in children and infants, about 1%-10% of the drug charged in the nebulizer may be delivered to the lungs. Compared with conventional facemask aerosol interfaces, this amount is significantly lower than amounts delivered to adults (i.e., up to 25% of the nominal dose), but similar to amounts delivered to children and infants, the latter having a predominantly nasal breathing. However,

significant clinical effects have been shown in both populations when delivering bronchodilators through NHF. This interface is particularly well tolerated and may be useful to improve aerosol therapy tolerance in the pediatric setting. Thus, among patients undergoing NHF therapy, bronchodilators may be delivered through this route. Whereas other drugs may be delivered this way or if there is a patient-centered benefit to specifically use NHF for aerosol therapy among patients without ongoing ventilatory support, requires further evaluation and technological development.

Kalburgi S, Halley T, Kolaitis IN, Hood K, Mittal V. **A Review of Heated High-Flow Nasal Cannula in Pediatrics-From Critical Care to Ward Use.** Current Treatment Options in Pediatrics. 2018;4(2):319-29. http://dx.doi.org/http://dx.doi.org/10.1007/s40746-018-0128-x
http://www.springer.com/medicine/pediatrics/journal/40746

Purpose of review: Heated high-flow nasal cannula (HFNC) is used in management of acute respiratory distress and is increasingly used in the emergency department (ED) and ward setting. This review aimed to highlight existing literature on ward use of HFNC. Recent findings: HFNC reduces work of breathing, increases mucociliary clearance, and improves oxygenation. Within limits, HFNC can be safely used on pediatric wards for management of moderate to severe respiratory distress. Weight-based and non-weight-based flow rates have been successfully used on pediatric wards, and maximum acceptable flow rates on wards are site and resource specific. Frequent monitoring can identify responders and non-responders requiring escalation. Early observation suggests that oral feeding is safe. Ward HFNC weaning protocols are lacking. Summary: Evidence suggests that in selected populations of children with moderate to severe respiratory distress due to acute bronchiolitis, HFNC with close monitoring is safe for use on the pediatric wards.

Maram KP, Chakraborty M. **High-flow ventilation in newborn infants - what is the evidence?** Paediatrics and Child Health (United Kingdom). 2017;27(1):1-8. http://dx.doi.org/http://dx.doi.org/10.1016/j.paed.2016.07.002
http://www.elsevier-international.com

Heated Humidified High Flow Nasal Cannula (HHHFNC) devices deliver an adjustable mixture of heated and humidified oxygen and air at a variable flow rate. Over recent years HHHFNC devices have become a popular method of non-invasive respiratory support in infants and preterm neonates due to ease of use and being well tolerated by infants. Recent evidence suggests that HHHFNC therapy may reduce work of breathing and improve the efficiency of ventilation in newborn infants, possibly with clinically significant outcomes such as avoidance of the need for nasal continuous positive airways pressure (nCPAP) and a reduced requirement for invasive ventilation. Despite its rapid adoption, there is relatively limited data about the exact mechanisms of action of HHHFNC. There is growing evidence of the feasibility of HHHFNC as an alternative to other forms of non-invasive ventilation in preterm infants. We review the mechanisms of action, and the supporting evidence in favour of using heated humidified high-flow nasal cannula therapy in newborn infants.

Ari A. **Aerosol drug delivery through high flow nasal cannula**. Curr Pharm Biotechnol. 2017;18(11):877-82. http://dx.doi.org/http://dx.doi.org/10.2174/1389201019666171219104217
http://www.eurekaselect.com/607/journal/current-pharmaceutical-biotechnology

Background: High flow nasal cannula (HFNC) is widely utilized to support critically ill adults, pediatrics and neonates. Through the continuous delivery of oxygen at high flow rates that meet or exceed patients' inspiratory flow, HFNC improves oxygenation, respiratory rates, patient comfort, and tolerance during therapy. As HFNC becomes more widely employed, clinicians have started to consider aerosol drug delivery through HFNC. Conclusion(s): Using HFNC along with nebulizers as a potential therapy in aerosol medicine is a new and innovative approach for aerosol drug delivery to patients with pulmonary diseases. The purpose of this paper is to review current in vitro and in vivo studies on aerosol drug delivery through HFNC in adults and children.

Al-Subu AM, Hagen S, Eldridge M, Boriosi J. **Aerosol therapy through high flow nasal cannula in pediatric patients**. Expert Rev Respir Med. 2017;11(12):945-53. http://dx.doi.org/http://dx.doi.org/10.1080/17476348.2017.1391095
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed18&AN=619122318

Introduction: High flow nasal cannula (HFNC) is increasingly used in pediatric patients suffering from respiratory failure. In some disease processes, patients may also benefit from aerosol therapy. Therefore, the use of HFNC to deliver aerosolized medications is a convenient and attractive option. Areas covered: This review aims to appraise available evidence concerning the efficiency of aerosol nebulized therapy delivery using HFNC in pediatric patients. Expert

commentary: Delivery of aerosol particles is a very complex process and depends on the use of oxygen vs. heliox, nebulizer type and position within the HFNC circuit, patient's breathing effort and pattern, and more importantly cannula size and flow rates. Current in vitro evidence suggests the amount of aerosol delivery is likely to be very low at high flows. Clinical studies are limited in pediatric patients and given the limited clinical data, it is not possible to make recommendations for or against aerosol delivery through HFNC for pediatric patients. Copyright © 2017 Informa UK Limited, trading as Taylor & Francis Group.

Roehr CC, Yoder BA, Davis PG, Ives K. **Evidence Support and Guidelines for Using Heated, Humidified, High-Flow Nasal Cannulae in Neonatology: Oxford Nasal High-Flow Therapy Meeting, 2015.** Clin Perinatol. 2016;43(4):693-705. http://dx.doi.org/http://dx.doi.org/10.1016/j.clp.2016.07.006
http://www.elsevier.com/inca/publications/store/6/2/3/3/2/4/index.htt

Nasal high-flow therapy (nHFT) has become a popular form of noninvasive respiratory support in neonatal intensive care units. A meeting held in Oxford, UK, in June 2015 examined the evidence base and proposed a consensus statement. In summary, nHFT is effective for support of preterm infants following extubation. There is growing evidence evaluating its use in the primary treatment of respiratory distress. Further study is needed to assess which clinical conditions are most amenable to nHFT support, the most effective flow rates, and escalation and weaning strategies. Its suitability as first-line treatment needs to be further evaluated. Copyright © 2016 Elsevier Inc.

Mindre sannsynlig vektlegging av flow rate i disse:

Wheeler CR, Smallwood CD. **Neonatal Respiratory Support: 2019 Year in Review**. Respiratory care. 2020;24. http://dx.doi.org/http://dx.doi.org/10.4187/respcare.07720
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emexb&AN=631342382

Respiratory support of the critically ill neonate has steadily shifted from invasive to noninvasive forms of support. There have recently been a number of important advances in our understanding of the changes to neonatal resuscitation practices as they pertain to clinically important outcomes, mechanisms of gas exchange for high-flow nasal cannula, and best use of noninvasive ventilation and predicting response. Although the proportion of infants requiring intubation and mechanical ventilation has decreased, the most severely ill often still require intubation and ventilation. Recently, volume-targeted ventilation, high-frequency ventilation, and different methods of assessing weaning and extubation have been investigated. This review summarizes a number of important advances that have been made in the management of prematurity and neonatal respiratory distress syndrome. Copyright © 2020 by Daedalus Enterprises.

Piper L, Stalets EL, Statile AM. **Clinical progress note: High flow nasal cannula therapy for bronchiolitis outside the ICU in infants**. J Hosp Med. 2020;15(1):49-51. http://dx.doi.org/http://dx.doi.org/10.12788/jhm.3328
https://mdedge-files-live.s3.us-east-2.amazonaws.com/files/s3fs-public/issues/articles/jhm015010049.pdf

Nasef N, Rashed HM, Aly H. **Practical aspects on the use of non-invasive respiratory support in preterm infants**. International Journal of Pediatrics and Adolescent Medicine. 2020. http://dx.doi.org/http://dx.doi.org/10.1016/j.ijpam.2020.02.005
http://www.journals.elsevier.com/international-journal-of-pediatrics-and-adolescent-medicine/

Preterm infants frequently present with respiratory insufficiency requiring respiratory assistance. Invasive mechanical ventilation has been associated with several short and long term complications. Therefore, the practice of early use of non-invasive ventilation has been adopted. Nasal CPAP proved efficacy as an initial therapy for preterm infants. Non-invasive positive pressure ventilation is an alternative used to mitigate CPAP failure in infants with apnea or increased work of breathing. High flow nasal cannula gained popularity primarily due to the ease of its use, despite multiple prominent trials that demonstrated its inferiority. Bi-level positive airway pressure and neurally adjusted non-invasive ventilatory are used in infants with apnea and increased work of breathing. The effectiveness of non invasive ventilation tools can be augmented by having a proper protocol for initiation, weaning, skin care, positioning, and developmental care during their application. Copyright © 2020 King Faisal Specialist Hospital & Research Centre (General Organization), Saudi Arabia

Junior JC, Azevedo RD, Araujo O, Carvalho WBD. **High-flow nasal cannula as a post-extubation respiratory support strategy in preterm infants: a systematic review and meta-analysis**. Jornal de Pediatria. 2020. http://dx.doi.org/http://dx.doi.org/10.1016/j.jped.2019.11.004

http://www.elsevier.com/journals/jornal-de-pediatria/0021-7557
Objective: Perform a systematic review and meta-analysis to assess the effectiveness and complications caused by the use of the high-flow nasal cannula in relation to the post-extubation continuous positive airway pressure system in preterm newborns. Data Sources: The searches were performed from January 2013 to December 2018 in the PubMed and Embase databases, as well as a manual search on the internet. Data Synthesis: Two reviewers independently conducted the search, and a third reviewer resolved questions that arose. Ninety-eight articles from the chosen sources were evaluated, and 66 were discarded because they did not meet the inclusion criteria (inadequate topic, age range, or design, in addition to the duplicates). Fifteen articles were read in full, and five more were discarded due to inadequacy to the topic or design. There were ten articles left for systematic review and four for meta-analysis. The study showed non-inferiority in terms of therapeutic failure of the high-flow nasal cannula in relation to continuous positive airway pressure after extubation of preterm newborns. In the meta-analysis, nasal trauma was significantly lower in patients submitted to the high-flow nasal cannula compared to those using continuous positive airway pressure ($p < 0.00001$). Conclusion(s): The high-flow nasal cannula is not inferior to continuous positive airway pressure for post-extubation respiratory support in preterm newborns with a gestational age of 32 weeks or less and greater than 28 weeks, in addition to resulting in less nasal trauma. Copyright © 2020 Sociedade Brasileira de Pediatria

Humphreys S, Schibler A. **Nasal high-flow oxygen in pediatric anesthesia and airway management**. Paediatr Anaesth. 2020;30(3):339-46.
http://dx.doi.org/http://dx.doi.org/10.1111/pan.13782
http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1460-9592

Nasal High-Flow (NHF) is weight-dependent in children, aimed to match peak inspiratory flow and thereby deliver an accurate FiO<inf>2</inf> with a splinting pressure of 4-6 cm H<inf>2</inf>O. During apnea in children, NHF oxygen can double the expected time to desaturation below 90% in well children but there is no ventilatory exchange; therefore, children do not "THRIVE". Total intravenous anesthesia competency to maintain spontaneous breathing is an important adjunct for successful NHF oxygenation technique during anesthesia. Jaw thrust to maintain a patent upper airway is paramount until surgical instrumentation occurs. There is no evidence to support safe use of NHF oxygen with LASER use due to increased risk of airway fire. Copyright © 2019 John Wiley & Sons Ltd

Zielinska A, Jassem-Bobowicz J, Kwiatkowska J. **Oxygen therapy with high-flow nasal cannulas in children with acute bronchiolitis**. Anaesthesiology Intensive Therapy. 2019;51(1):51-5.
http://dx.doi.org/http://dx.doi.org/10.5603/AIT.2019.0010
Acute bronchiolitis is a common disease in children below 24 months of age. The most common aetiology of this disease is a respiratory syncytial virus infection. Since there is no effective treatment for bronchiolitis, supportive therapy alleviating symptoms and preventing respiratory failure is recommended. Oxygen therapy and appropriate nutrition during the disease are considered effective, particularly in severe cases. The choice of oxygen support is crucial. The present paper discusses oxygen therapy using high-flow nasal cannulas. Moreover, the safety of the method, its adverse side effects and practical pre-treatment guidelines are discussed. Copyright © 2019 Via Medica. All rights reserved.

Travers CP, Carlo WA. **New Methods for Noninvasive Oxygen Administration**. Clin Perinatol. 2019;46(3):449-58.
http://dx.doi.org/http://dx.doi.org/10.1016/j.clp.2019.05.012
http://www.elsevier.com/inca/publications/store/6/2/3/3/2/4/index.htt
Oxygen therapy is an essential part of neonatal care. Targeting oxygen saturations and preventing hypoxemia and hyperoxemia is difficult, particularly in preterm infants. The mode of oxygen delivery directly affects the stability of oxygen saturations, hypoxemia, and hyperoxemia. This stability has important clinical implications. New methods of noninvasive oxygen administration, including closed-loop automated control and servo-controlled oxygen environments, have been developed to improve oxygen saturation targeting and decrease episodes of hyperoxemia and hypoxemia. Copyright © 2019 Elsevier Inc.

Tauzin M, Durrmeyer X. **Managing neonatal pain in the era of non-invasive respiratory support**. Seminars in Fetal and Neonatal Medicine. 2019;24(4).
http://dx.doi.org/http://dx.doi.org/10.1016/j.siny.2019.04.004
http://www.sciencedirect.com/science/journal/1744165X
Non-invasive ventilation is currently the preferred respiratory support for premature infants with respiratory distress. The lung-protective effects of non-invasive ventilation should however not prompt disregard for the possible pain and discomfort it can generate. Non-pharmacological interventions should be used in all premature infants, regardless of

their respiratory support, and are not detailed in this review. This review includes currently available evidence and gaps in knowledge regarding three aspects of pain management in premature infants receiving non-invasive ventilation: optimisation of non-invasive ventilation especially through the choice of positive pressure source, appropriate interface and synchronisation; sedative or analgesic drug use for strategies aiming at administering surfactant with reduction or avoidance of tracheal ventilation; risks and benefits of some analgesic and/or sedative drugs used to treat or prevent prolonged pain and discomfort during non-invasive ventilation. In spite of limited robust evidence, this overview should trigger caregivers' reflections on their daily practice. Copyright © 2019 Elsevier Ltd

Permall DL, Pasha AB, Chen XQ. **Current insights in non-invasive ventilation for the treatment of neonatal respiratory disease.** Ital J Pediatr. 2019;45(1).
http://dx.doi.org/http://dx.doi.org/10.1186/s13052-019-0707-x
http://www.ijponline.net/
Deleterious consequences of the management of respiratory distress syndrome (RDS) with invasive ventilation have led to more in-depth investigation of non-invasive ventilation (NIV) modalities. NIV has significantly and positively altered the treatment outcomes and improved mortality rates of preterm infants with RDS. Among the different NIV modes, nasal intermittent positive pressure ventilation (NIPPV) has shown considerable benefits compared to nasal continuous positive airway pressure (NCPAP). Despite reports of heated humidified high-flow nasal cannula's (HHHFNC) non-inferiority compared to NCPAP, some trials have been terminated due to high treatment failure rates with HHHFNC use. Moreover, RDS management with the combination of INSURE (INtubation SURfactant Extubation) technique and NIV ensures higher success rates. This review elaborates on the currently used various modes of NIV and novel techniques are also briefly discussed. Copyright © 2019 The Author(s).

O'Brien S, Craig S, Babl FE, Borland ML, Oakley E, Dalziel SR. **'Rational use of high-flow therapy in infants with bronchiolitis. What do the latest trials tell us?' A Paediatric Research in Emergency Departments International Collaborative perspective**. J Paediatr Child Health. 2019;55(7):746-52.
http://dx.doi.org/http://dx.doi.org/10.1111/jpc.14496
http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1440-1754
Bronchiolitis is the most common reason for infants to be hospitalised. Over the past decade, the use of high-flow nasal cannulae (HFNC) therapy has increased markedly and it is now utilised not only in the intensive care unit setting but in general paediatric wards and emergency departments. The aim of this systematic review was to summarise and critique the current evidence-base for the use of HFNC in infants with bronchiolitis. We searched Ovid Medline, OvidEmbase, PubMed, Cinahl, Cochrane Library, Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Trials for systematic reviews and randomised controlled trials of HFNC therapy in infants with bronchiolitis from 1 January 2000 to 27 June 2018. We identified four randomised controlled trials (n = 1891) of HFNC in infants with bronchiolitis: three of these studies involved infants treated in emergency departments and inpatient paediatric wards in Spain, Australia and New Zealand, and one study involved infants treated in paediatric intensive care units in France. The findings of this review suggest that HFNC should be used as a rescue treatment for hypoxaemic infants who have not responded to standard sub nasal oxygen therapy. The use of HFNC for work of breathing in the absence of hypoxaemia, and severe disease, is not currently supported by the evidence, and should only be considered in the context of an appropriate research trial. Copyright © 2019 Paediatrics and Child Health Division (The Royal Australasian College of Physicians)

Lyons C, Callaghan M. **Uses and mechanisms of apnoeic oxygenation: a narrative review**. Anaesthesia. 2019;74(4):497-507.
http://dx.doi.org/http://dx.doi.org/10.1111/anae.14565
http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2044
Apnoeic oxygenation refers to oxygenation in the absence of spontaneous respiration or mechanical ventilation. It has been described in humans for over half a century and has seen a resurgence in interest given its potential to delay oxygen desaturation during airway management, especially with the advent of high-flow nasal cannulae. This narrative review summarises our current understanding of the mechanisms of gas exchange during apnoeic oxygenation and its diverse range of clinical applications, including its use at induction of anaesthesia and for the facilitation of 'tubeless anaesthesia'. Additional discussion covers use in critical care, obese, obstetric and paediatric sub-populations. The article also highlights current research efforts aiming to enhance the evidence base for the use of this technique. Copyright © 2019 Association of Anaesthetists

Treff fra søk til fagprosedyre

Luo J, Duke T, Chisti MJ, Kepreotes E, Kalinowski V, Li J. **Efficacy of High-Flow Nasal Cannula vs Standard Oxygen Therapy or Nasal Continuous Positive Airway Pressure in Children with Respiratory Distress: A Meta-Analysis**. J Pediatr. 2019;215:199-208.e8. http://dx.doi.org/http://dx.doi.org/10.1016/j.jpeds.2019.07.059
http://www.elsevier.com/inca/publications/store/6/2/3/3/1/1/index.htt
Objectives: To evaluate the efficacy of high-flow nasal cannula (HFNC) oxygen therapy in providing respiratory support of children with acute lower respiratory infection (ALRI), hypoxemia, and respiratory distress. Study design: We performed a meta-analysis of randomized controlled trials that compared HFNC and standard flow oxygen therapy or nasal continuous positive airway pressure (nCPAP) and reported treatment failure as an outcome. Data were synthesized using Mann-Whitney U test. Result(s): Compared with standard oxygen therapy, HFNC significantly reduced treatment failure (risk ratio [RR] 0.49, 95% CI 0.40-0.60, P < .001) in children with mild hypoxemia (arterial pulse oximetry [SpO<inf>2</inf>] >90% on room air). HFNC had an increased risk of treatment failure compared with nCPAP in infants age 1-6 months with severe hypoxemia (SpO<inf>2</inf> <90% on room air or SpO<inf>2</inf> >90% on supplemental oxygen) (RR 1.77, 95% CI 1.17-2.67, P = .007). No significant differences were found in intubation rates and mortality between HFNC and standard oxygen therapy or nCPAP. HFNC had a lower risk of nasal trauma compared with nCPAP (RR 0.35, 95% CI 0.16-0.77, P = .009). Conclusion(s): Among children <5 years of age with ALRI, respiratory distress, and mild hypoxemia, HFNC reduced the risk of treatment failure when compared with standard oxygen therapy. However, nCPAP was associated with a lower risk of treatment failure than HFNC in infants age 1-6 months with ALRI, moderate-to-severe respiratory distress, and severe hypoxemia. No differences were found in intubation and mortality between HFNC and standard oxygen therapy or nCPAP. Copyright © 2019 Elsevier Inc.

Lin J, Zhang Y, Xiong L, Liu S, Gong C, Dai J. **High-flow nasal cannula therapy for children with bronchiolitis: A systematic review and meta-analysis.** Archives of Disease in Childhood. 2019.
http://dx.doi.org/http://dx.doi.org/10.1136/archdischild-2018-315846
http://adc.bmjjournals.com
Objectives: To review the effects and safety of high-flow nasal cannula (HFNC) for bronchiolitis. Method(s): Six electronic databases including PubMed, EMBASE, Cochrane Central Register of Controlled Trials, China National Knowledge Infrastructure, CQ VIP Database and Wanfang Data were searched from their inception to 1 June 2018. Randomised controlled trials (RCTs) which investigated the effects of HFNC versus other forms of oxygen therapies for bronchiolitis were included. Result(s): Nine RCTs with 2121 children met the eligibility criteria. There was no significant difference in length of stay in hospital (LOS), length of oxygen supplementation (LOO), transfer to intensive care unit, incidence of intubation, respiratory rate, SpO<inf>2</inf> and adverse events in HFNC group compared with standard oxygen therapy (SOT) and nasal continuous positive airway pressure (nCPAP) groups. A significant reduction of the incidence of treatment failure (risk ratio (RR) 0.50, 95% CI 0.40 to 0.62, p<0.01) was observed in HFNC group compared with SOT group, but there was a significant increase of the incidence of treatment failure (RR 1.61, 95% CI 1.06 to 2.42, p0.02) in HFNC group compared with nCPAP group. In subgroup analysis, LOS was significantly decreased in HFNC group compared with SOT group in low-income and middle-income countries. Conclusion(s): The systematic review suggests HFNC is safe as an initial respiratory management, but the evidence is still lacking to show benefits for children with bronchiolitis compared with SOT or nCPAP. Copyright © Author(s) (or their employer(s)) 2019. No commercial re-use. See rights and permissions. Published by BMJ.

2016-2018:

1. Wang J, Lee KP, Chong SL, Loi M, Lee JH. **High flow nasal cannula in the emergency department: indications, safety and effectiveness**. Expert Rev Med Devices. 2018;15(12):929-35.
http://dx.doi.org/http://dx.doi.org/10.1080/17434440.2018.1548276
http://www.tandfonline.com/loi/ierd20
Introduction: Heated humidified high flow nasal cannula therapy (HHHFNCT) is emerging as a popular non-invasive mode of respiratory support in adults and children. In recent years, its use has extended beyond the intensive care unit to other clinical areas. This review aims to explore the mechanism of action, indications, safety, and effectiveness of HHHFNCT use in the Emergency Department (ED). Areas covered: The mechanism of action of HHHFNCT, as well as its use in adult and pediatric ED will be discussed in this review. Expert commentary: While there exists increasing enthusiasm in the use of HHHFNCT in the ED, constant monitoring of the patients and an experienced assessment of their response to treatment are critical and may require additional manpower deployment, which may be challenging, in the busy ED environment. Our experience with the use of HHHFNCT in children is still growing. Continual research in this area remains crucial in helping us better understand the patient types and conditions managed in ED that would most benefit from this device. Copyright © 2018, © 2018 Informa UK Limited, trading as Taylor & Francis Group.

2. Shaw SC, Venkatnarayan K, Gupta R. **Is High-Flow Nasal Cannula Useful as Primary Respiratory Support in Preterm Infants**? Neonatology. 2018;114(1):25.
http://dx.doi.org/http://dx.doi.org/10.1159/000487989
http://content.karger.com/ProdukteDB/produkte.asp?Aktion=JournalHome&ProduktNr=232056

3. Liu G, Fan C, Wu H. **High-flow nasal cannula therapies for respiratory management in pediatric patients.** Minerva Pediatr. 2018;70(5):488-92.
http://dx.doi.org/http://dx.doi.org/10.23736/S0026-4946.17.04781-8
https://www.minervamedica.it/en/getpdf/wQ0DEMZFk%252BG4Zok2SRib%252FQ438OaK7wPrvfgfVrFDcPop3f3IXRmsgE7m8wF43OGBAIjV4KBoBPgnbVBe7hQ%252B5Q%253D%253D/R15Y2018N05A0488.pdf
High-flow nasal cannula (HFNC) oxygen therapy is a non-invasive form of respiratory support that is rapidly being taken up in pediatric intensive care units (PICU). For infants with bronchiolitis, who are the largest non-elective source of admissions to a PICU, there is some evidence that using HFNC therapy reduces the need for intubation and mechanical ventilation. The aim of this review article is to explore, describe, critique and add to the evidence surrounding the use of HFNC therapy in the pediatric population for the management of respiratory distress. Copyright © 2018 EDIZIONI MINERVA MEDICA.

4. Kotwinski D, Paton L, Langford R. **The role of high flow nasal oxygen therapy in anaesthesia**. British journal of hospital medicine (London, England : 2005). 2018;79(11):620-7.
http://dx.doi.org/http://dx.doi.org/10.12968/hmed.2018.79.11.620
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emexb&AN=624880519
The delivery of oxygen is a key component of anaesthetic practice. High flow nasal oxygen therapy is a relatively new addition to more traditional means of oxygenation which provides heated and humidified flows of controlled oxygen/air mixes achieving rates of up to 120 litres/min. The physiological benefits include nasopharyngeal dead space washout, reduced work of breathing, alveolar recruitment, maintained mucociliary function and the ability to provide apnoeic oxygenation. This article considers the current evidence for high flow nasal oxygen therapy in perioperative anaesthetic care during pre-oxygenation and intubation, management of the difficult airway, oxygenation for shared airway surgery, extubation and postoperative support, obstetric and paediatric anaesthesia.

5. Imbulana DI, Manley BJ, Dawson JA, Davis PG, Owen LS. **Nasal injury in preterm infants receiving non-invasive respiratory support: a systematic review.** Arch Dis Child. 2018;Fetal and neonatal edition. 103(1):F29-F35.
http://dx.doi.org/http://dx.doi.org/10.1136/archdischild-2017-313418
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed19&AN=619869580
OBJECTIVE: Binasal prongs are the most commonly used interface for the delivery of nasal positive airway pressure (CPAP) to preterm infants. However, they are associated with pressure-related nasal injury, which causes pain and discomfort. Nasal injury may necessitate a change in interface and occasionally damage is severe enough to require surgical repair. We aim to determine the incidence and risk factors for nasal injury in preterm infants, and to provide clinicians with strategies to effectively prevent and treat it. DESIGN: We conducted a systematic search of databases including MEDLINE (PubMed including the Cochrane Library), EMBASE, CINAHL and Scopus. Included studies enrolled human preterm infants and were published prior to 20 February 2017. RESULTS: Forty-five studies were identified, including 14 ra ndomised controlled trials, 10 observational studies, two cohort studies, eight case reports and 11 reviews. The incidence of nasal injury in preterm infants ranged from 20-100%. Infants born <30 weeks' gestation are at highest risk. Strategies shown to reduce nasal injury included: nasal barrier dressings (2 studies, n=244, risk ratio (RD) -0.12, 95%, CI - 0.20 to -0.04), nasal high flow therapy as an alternative to binasal prong CPAP (7 studies, n=1570, risk difference (RD) -0.14, 95% CI -0.17 to -0.10), and nasal masks rather than binasal prongs (5 studies, n=544, RR 0.80, 95% CI 0.64 to 1.00). CONCLUSIONS AND RELEVANCE: Nasal injury is common in preterm infants born <30 weeks' gestational age receiving CPAP via binasal prongs. Larger randomised trials are required to fully evaluate strategies to reduce nasal injury. Copyright © Article author(s) (or their employer(s) unless otherwise stated in the text of the article) 2018. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

6. Conte F, Orfeo L, Gizzi C, Massenzi L, Fasola S. **Rapid systematic review shows that using a high-flow nasal cannula is inferior to nasal continuous positive airway pressure as first-line support in preterm neonates**. Acta Paediatrica, International Journal of Paediatrics. 2018;107(10):1684-96.
http://dx.doi.org/http://dx.doi.org/10.1111/apa.14396
http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1651-2227

Aim: We reviewed using a high-flow nasal cannula (HFNC) as first-line support for preterm neonates with, or at risk of, respiratory distress. Method(s): This rapid systematic review covered biomedical databases up to June 2017. We included randomised controlled trials (RCTs) published in English. The reference lists of the studies and relevant reviews we included were also screened. We performed the study selection, data extraction, study quality assessment, meta-analysis and quality of evidence assessment following the Grading of Recommendations Assessment, Development and Evaluation system. Result(s): Pooled results from six RCTs covering 1227 neonates showed moderate-quality evidence that HFNC was associated with a higher rate of failure than nasal continuous positive airway pressure (NCPAP) in preterm neonates of at least 28 weeks of gestation, with a risk ratio of 1.57. Low-quality evidence showed no significant differences between HFNC and NCPAP in the need for intubation and bronchopulmonary dysplasia rate. HFNC yielded a lower rate of nasal injury (risk ratio 0.50). When HFNC failed, intubation was avoided in some neonates by switching them to NCPAP. Conclusion(s): HFNC had higher failure rates than NCPAP when used as first-line support. Subsequently switching to NCPAP sometimes avoided intubation. Data on the most immature neonates were lacking. Copyright ©2018 Foundation Acta Paediatrica. Published by John Wiley & Sons Ltd

7. Al-Mukhaini KS, Al-Rahbi NM. **Noninvasive Ventilation and High-Flow Nasal Cannulae Therapy for Children with Acute Respiratory Failure: An overview.** Sultan Qaboos Univ Med J. 2018;18(3):e278-e85.
http://dx.doi.org/http://dx.doi.org/10.18295/squmj.2018.18.03.003
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emexa&AN=625783556
Noninvasive ventilation (NIV) refers to the use of techniques to deliver artificial respiration to the lungs without the need for endotracheal intubation. As NIV has proven beneficial in comparison to invasive mechanical ventilation, it has become the optimal modality for initial respiratory support among children in respiratory distress. High-flow nasal cannulae and applications of conventional NIV in comparison to HFNC.

8. Slain KN, Shein SL, Rotta AT. **The use of high-flow nasal cannula in the pediatric emergency department**. J Pediatr (Rio J). 2017;93(Supplement 1):36-45.
http://dx.doi.org/http://dx.doi.org/10.1016/j.jped.2017.06.006
http://www.elsevier.com/journals/jornal-de-pediatria/0021-7557
Objectives To summarize the current literature describing high-flow nasal cannula use in children, the components and mechanisms of action of a high-flow nasal cannula system, the appropriate clinical applications, and its role in the pediatric emergency department. Sources A computer-based search of PubMed/MEDLINE and Google Scholar for literature on high-flow nasal cannula use in children was performed. Data summary High-flow nasal cannula, a non-invasive respiratory support modality, provides heated and fully humidified gas mixtures to patients via a nasal cannula interface. High-flow nasal cannula likely supports respiration though reduced inspiratory resistance, washout of the nasopharyngeal dead space, reduced metabolic work related to gas conditioning, improved airway conductance and mucociliary clearance, and provision of low levels of positive airway pressure. Most data describing high-flow nasal cannula use in children focuses on those with bronchiolitis, although high-flow nasal cannula has been used in children with other respiratory diseases. Introduction of high-flow nasal cannula into clinical practice, including in the emergency department, has been associated with decreased rates of endotracheal intubation. Limited prospective interventional data suggest that high-flow nasal cannula may be similarly efficacious as continuous positive airway pressure and more efficacious than standard oxygen therapy for some patients. Patient characteristics, such as improved tachycardia and tachypnea, have been associated with a lack of progression to endotracheal intubation. Reported adverse effects are rare. Conclusions High-flow nasal cannula should be considered for pediatric emergency department patients with respiratory distress not requiring immediate endotracheal intubation; prospective, pediatric emergency department-specific trials are needed to better determine responsive patient populations, ideal high-flow nasal cannula settings, and comparative efficacy vs. other respiratory support modalities. Copyright © 2017 Sociedade Brasileira de Pediatria

9. Maffei G, Gorgoglione S, Vento G. **Noninvasive ventilation: Systematic approach and new perspectives for preterm infants**. Journal of Clinical Neonatology. 2017;6(3):135-43.
http://dx.doi.org/http://dx.doi.org/10.4103/jcn.JCN_121_16
http://www.jcnonweb.com/
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed18&AN=617988333
Noninvasive ventilation (NIV) refers to the delivery of ventilatory support through nasal prongs/mask. NIV, associated with nasal continuous positive airway pressure, representing the main method to improve the functional residual capacity in the newborn (at term or preterm) avoiding invasive actions such as tracheal intubation. Copyright © 2017 Journal of Clinical Neonatology Published by Wolters Kluwer - Medknow.

10. Lee M, Nagler J. **High-flow nasal cannula therapy beyond the perinatal period**. Curr Opin Pediatr. 2017;29(3):291-6.
http://dx.doi.org/http://dx.doi.org/10.1097/MOP.0000000000000494
http://journals.lww.com/co-pediatrics/pages/default.aspx
Purpose of review High-flow nasal cannula (HFNC) is emerging as a means of oxygen delivery and respiratory support for a range of conditions outside the perinatal period. We aim to review the mechanisms of action and advantages of HFNC and to summarize current findings regarding clinical benefit in specific pediatric disease processes and in patients with significant respiratory distress. Recent findings Currently published studies outside the neonatal population demonstrate both safety and efficacy of this mode of respiratory support. Retrospective and prospective observational trials have shown improvements in oxygenation and respiratory distress, as well as reductions in the need for intubation in select patient populations. Randomized controlled trials are ongoing. Summary HFNC is emerging as a means of oxygen delivery and respiratory support across a wide range of pediatric conditions. Available data suggest that it is well tolerated by children and can have a favorable effect on clinical outcomes. Future research will better define optimal patient populations and best practices for use. Copyright © 2017 Wolters Kluwer Health, Inc. All rights reserved.

11. Kotecha SJ, Chakraborty M, Kotecha S. **Nasal continuous positive airway pressure outperforms heated high-flow nasal cannula therapy as primary respiratory therapy in preterm infants**. Evid Based Med. 2017;22(2):63.
http://dx.doi.org/http://dx.doi.org/10.1136/ebmed-2016-110618
http://ebm.bmj.com/

12. Ferguson KN, Roberts CT, Manley BJ, Davis PG. **Interventions to improve rates of successful extubation in preterm infants a systematic review and meta-analysis**. JAMA Pediatrics. 2017;171(2):165-74.
http://dx.doi.org/http://dx.doi.org/10.1001/jamapediatrics.2016.3015
http://jamanetwork.com/pdfaccess.ashx?url=/data/journals/peds/936022/jamapediatrics_ferguson_2016_oi_160076.pdf&routename=jamapediatrics
IMPORTANCE Clinicians aim to extubate preterm infants as early as possible, to minimize the risks of mechanical ventilation. Extubation is often unsuccessful owing to lung disease or inadequate respiratory drive. OBJECTIVE To conduct a systematic review and meta-analysis of interventions to improve rates of successful extubation in preterm infants. DATA SOURCES Searches were undertaken in PubMed and The Cochrane Library. STUDY SELECTION The review was conducted using the methods of the Cochrane Collaboration and Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Studies were included if they were randomized clinical trials published in English, enrolled intubated preterm infants (born <37 weeks' gestation), and reported 1 or both of the primary outcomes. DATA EXTRACTION AND SYNTHESIS One thousand three hundred seventy-nine titleswere screened independently by 2 investigators to assess need for full-text review. Disagreements were resolved via consensus of all authors. Where no Cochrane Review existed for an intervention, or not all identified studies were included, a new pooled analysis was performed. MAIN OUTCOMES AND MEASURES Primary outcomeswere treatment failure or reintubation within 7 days of extubation. RESULTS Fifty studies were eligible for inclusion. Continuous positive airway pressure reduced extubation failure in comparison with head-box oxygen (risk ratio [RR], 0.59; 95%CI, 0.48-0.72; number needed to treat [NNT], 6; 95%CI, 3-9). Nasal intermittent positive pressure ventilation was superior to continuous positive airway pressure in preventing extubation failure (RR, 0.70; 95%CI, 0.60-0.81; NNT, 8; 95%CI, 5-13). High-flow nasal cannula therapy and continuous positive airway pressure had similar efficacy (RR, 1.11; 95%CI, 0.84-1.47). Methylxanthines reduced extubation failure (RR, 0.48; 95%CI, 0.32-0.71; NNT, 4; 95%CI, 2-7) compared with placebo or no treatment. Corticosteroids (RR, 0.18; 95%CI, 0.04-0.97; NNT, 12; 95%CI, 6-100) and chest physiotherapy (RR, 0.32; 95%CI, 0.13-0.82; NNT, 15; 95%CI, 7-50) both reduced extubation failure rates but were associated with significant adverse effects. Doxapram did not aid successful extubation (RR, 0.80; 95%CI, 0.22-2.97). CONCLUSIONS AND RELEVANCE Preterm infants should be extubated to noninvasive respiratory support. Caffeine should be used routinely, while corticosteroids should be used judiciously, weighing up the competing risks of bronchopulmonary dysplasia and neurodevelopmental harm. Copyright © 2017 American Medical Association.

13. Fedor KL. **Noninvasive respiratory support in infants and children**. Respir Care. 2017;62(6):699-717.
http://dx.doi.org/http://dx.doi.org/10.4187/respcare.05244
http://rc.rcjournal.com/content/respcare/62/6/699.full.pdf
CPAP and noninvasive ventilation (NIV) offer an alternative to intubation and mechanical ventilation in the treatment of acute and chronic respiratory disorders commonly encountered in infants and children. There are many distinct challenges associated with the application, management, and safety of CPAP and NIV in the pediatric population. This review attempts to identify indications, contraindications, management strategies, and safety measures associated with the application of CPAP or NIV delivery in children. More recently, high-flow nasal cannula (HFNC) has emerged as an alternative to CPAP and NIV. Evidence related to the use of CPAP, NIV, and HFNC is included in this review. Copyright ©

14. Chao KY, Chen YL, Tsai LY, Chien YH, Mu SC. **The Role of Heated Humidified High-flow Nasal Cannula as Noninvasive Respiratory Support in Neonates**. Pediatr Neonatol. 2017;58(4):295-302.
http://dx.doi.org/http://dx.doi.org/10.1016/j.pedneo.2016.08.007
http://ajws.elsevier.com/pedn
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed18&AN=614505381
Recently, heated humidified high-flow nasal cannula (HHHFNC) has been introduced and applied as a noninvasive respiratory support in neonates. Although HHHFNC is widely used in neonates presenting with respiratory distress, the efficiency and safety when compared with nasal continuous positive airway pressure or noninvasive positive pressure ventilation are still controversial. This review aims to evaluate the performance and applications of HHHFNC in neonates. Copyright © 2017

15. Alexander J. **Advanced respiratory support on the paediatric ward**. Paediatrics and Child Health (United Kingdom). 2017;27(5):238-41.
http://dx.doi.org/http://dx.doi.org/10.1016/j.paed.2017.01.007
http://www.elsevier-international.com
The ability to provide additional respiratory support previously restricted to intensive care units or to specialised units is now extended to many paediatric wards. When provided in designated areas by trained staff, treatments like High Flow Nasal Cannula Oxygen (HHFNC), Continuous Positive Airway Pressure (CPAP) and Bilevel Positive Airway Pressure (BiPAP) can be delivered effectively locally and may prevent the transfer of some children to intensive care units for noninvasive ventilation. This article provides a brief overview of the causes of respiratory compromise and outlines the basic principles of the different techniques available and provides pointers towards effective administration of these techniques. Copyright © 2017

16. Schibler A, Franklin D. **Respiratory support for children in the emergency department**. J Paediatr Child Health. 2016;52(2):192-6.
http://dx.doi.org/http://dx.doi.org/10.1111/jpc.13078
http://www.blackwell-science.com/jpc
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed17&AN=609867623
Respiratory support in paediatric emergency settings ranges from oxygen delivery with subnasal oxygen to invasive mechanical ventilation. Recent data suggest that oxygen can cause reperfusion injuries and should be delivered with caution within well-defined clinical target ranges. Most mild to moderate respiratory distress conditions with an oxygen requirement may benefit from early use of continuous positive airway pressure. High-flow nasal cannula therapy (HFNC) is an emerging alternative way to support the inspiratory effort combined with oxygen delivery and positive expiratory pressures without the need of complicated equipment or good compliance from the child. Besides a positive pressure support effect, HFNC therapy reduces the physiological dead space with improved CO<inf>2</inf> clearance. A decrease in heart and respiratory rate within the first few hours after initiation of HFNC therapy is likely to identify responders of the treatment. The use of non-invasive ventilation such as continuous positive airway pressure or the use of bi-level positive airway pressure ventilation in emergency departments has increased, and it has been recognised that continuous positive airway pressure support for older children with asthma is particularly efficient. Copyright © 2016 The Authors Journal of Paediatrics and Child Health © 2016 Paediatrics and Child Health Division (Royal Australasian College of Physicians).

17. Null D, Crezee K, Bleak T. **Noninvasive Respiratory Support During Transportation**. Clin Perinatol. 2016;43(4):741-54.
http://dx.doi.org/htt
p://dx.doi.org/10.1016/j.clp.2016.07.009
http://www.elsevier.com/inca/publications/store/6/2/3/3/2/4/index.htt
To minimize ventilator-associated lung injury in neonates, use of noninvasive (NIV) respiratory support has markedly increased over the past decade, especially in neonates younger than 28-weeks gestational age and 1250 g. Previously, neonates with respiratory failure who required anything greater than an oxyhood or low-flow nasal cannula were intubated for transport. This increased use has required transport teams to develop or incorporate a new set of support tools to minimize lung injury. This article reviews the various modes of NIV used during neonatal transport, important patient selection criteria, appropriate assessment, and the associated risks and benefits. Copyright © 2016 Elsevier Inc.

18. Morley SL. **Non-invasive ventilation in paediatric critical care.** Paediatr Respir Rev. 2016;20:24-31.
http://dx.doi.org/http://dx.doi.org/10.1016/j.prrv.2016.03.001
http://www.elsevier.com/inca/publications/store/6/2/3/0/6/6/index.htt
Non-invasive ventilation (NIV) is a well recognised and increasingly prevalent intervention in the paediatric critical care setting. In the acute setting NIV is used to provide respiratory support in a flexible manner that avoids a requirement for endotracheal intubation or tracheostomy, with the aim of avoiding the complications of invasive ventilation. This article will explore the physiological benefits, complications and epidemiology of the different modes of NIV including continuous positive airway pressure (CPAP), non-invasive positive pressure ventilation (NIPPV) and high-flow nasal cannula oxygen (HFNC). The currently available equipment and patient interfaces will be described, and the practical aspects of using NIV clinically will be explored. The current evidence for use of NIV in different clinical settings will be discussed, drawing on adult and neonatal as well as paediatric literature. Copyright © 2016 Elsevier Ltd

19. Mardegan V, Priante E, Lolli E, Lago P, Baraldi E. **Heated, Humidified High-Flow Nasal Cannulae as a Form of Noninvasive Respiratory Support for Preterm Infants and Children with Acute Respiratory Failure**. Am J Perinatol. 2016;33(11):1058-61.
http://dx.doi.org/http://dx.doi.org/10.1055/s-0036-1586111
http://www.thieme-connect.com/ejournals/toc/ajp
Heated, humidified high-flow delivered by nasal cannulae (HHHFNC) is increasingly used for noninvasive respiratory support in preterm infants and critically ill children due to its perceived effectiveness and ease of use. Evidence from randomized controlled trials suggests that HHHFNC and continuous positive airway pressure (CPAP) are equally effective as postextubation support in preterm infants. HHHFNC is also used for weaning preterm infants from CPAP. Data on HHHFNC used as the primary support for treating respiratory distress syndrome are conflicting. HHHFNC use in preterm infants is associated with reduced nasal trauma. Inability to measure the pressure generated by HHHFNC systems is a concern because overexpansion can lead to an air leak and lung injury. Great caution is warranted when HHHFNC is used in extremely low-birth-weight infants (who were rarely included in these randomized controlled trials) because a recent retrospective study found its use is associated with a higher likelihood of bronchopulmonary dysplasia or death in this population. HHHFNC has also become popular in pediatric intensive care units and pediatric wards as a method for delivering oxygen and noninvasive respiratory support. Most published studies were conducted on infants and young children with bronchiolitis. The results of a few observational studies and two randomized trials suggest that HHHFNC therapy is effective in the treatment of bronchiolitis. This review discusses the proposed mechanisms of action behind HHHFNC, the results of observational studies, and the evidence emerging from clinical trials on the use of HHHFNC in preterm infants and children critically ill with bronchiolitis. Copyright © 2016 by Thieme Medical Publishers, Inc.

20. Manley BJ, Owen LS. **High-flow nasal cannula: Mechanisms, evidence and recommendations. Seminars in Fetal and Neonatal Medicine**. 2016;21(3):139-45.
http://dx.doi.org/http://dx.doi.org/10.1016/j.siny.2016.01.002
http://www.sciencedirect.com/science/journal/1744165X
The use of high-flow nasal cannula (HF) therapy as respiratory support for preterm infants is rapidly increasing, due to its perceived ease of use and other potential benefits over the standard 'non-invasive' respiratory support, continuous positive airway pressure (CPAP). The evidence from randomized trials suggests that HF is an alternative to CPAP for post-extubation support of preterm infants. Limited data are available from randomized trials comparing HF with CPAP as primary support, and few trials have included extremely preterm infants. This review discusses the proposed mechanisms of action of HF, the evidence from clinical trials of HF use in preterm infants, and proposes recommendations for evidence-based practice. Copyright © 2016 Elsevier Ltd

21. Manley BJ. **Nasal High-Flow Therapy for Preterm Infants: Review of Neonatal Trial Data**. Clin Perinatol. 2016;43(4):673-91.
http://dx.doi.org/http://dx.doi.org/10.1016/j.clp.2016.07.005
http://www.elsevier.com/inca/publications/store/6/2/3/3/2/4/index.htt
Heated, humidified, nasal high-flow (HF) therapy is a promising treatment for preterm infants, and almost certainly has a place in the clinical care of this population. It is only in the last few years that data have become available from randomized trials comparing HF with other noninvasive respiratory support modes, particularly nasal continuous positive airway pressure. This article discusses the evidence for HF use from randomized clinical trials in preterm infants and proposes recommendations for evidence-based practice. Copyright © 2016 Elsevier Inc.

22. Jeon GW. **Respiratory support with heated humidified high flow nasal cannula in preterm infants**. Korean J Pediatr. 2016;59(10):389-94.
http://dx.doi.org/http://dx.doi.org/10.3345/kjp.2016.59.10.389
http://www.kjp.or.kr/upload/KJP_59_10_389_394_20125550571.pdf
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed17&AN=612871666
The incidence of bronchopulmonary dysplasia (BPD) has not decreased over the last decade. The most important way to decrease BPD is by weaning the patient from the ventilator as soon as possible in order to reduce ventilator-induced lung injury that underlies BPD, and by using a noninvasive ventilator (NIV). Use of a heated, humidified, high flow nasal cannula (HHHFNC), which is the most recently introduced NIV mode for respiratory support in preterm infants, is rapidly increasing in many neonatal intensive care units due to the technical ease of use without sealing, and the attending physician's preference compared to other NIV modes. A number of studies have shown that nasal breakdown and neonatal complications were lower when using a HHHFNC than when using nasal continuous positive airway pressure (nCPAP), or nasal intermittent positive pressure ventilation. The rates of extubation failure during respiratory support were not different between patients who used HHHFNC and nCPAP. However, data from the use of HHHFNC as the initial respiratory support "after birth", particularly in extremely preterm infants, are lacking. Although the HHHFNC is efficacious and safe, large randomized controlled trials are needed before the HHHFNC can be considered an NIV standard, particularly for extremely preterm infants. Copyright © 2016 by The Korean Pediatric Society.

23. Greenough A, Lingam I. **Invasive and non-invasive ventilation for prematurely born infants - Current practice in neonatal ventilation**. Expert Rev Respir Med. 2016;10(2):185-92.
http://dx.doi.org/http://dx.doi.org/10.1586/17476348.2016.1135741
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed17&AN=608264615
Non-invasive techniques, include nasal continuous positive airways pressure (nCPAP), nasal intermittent positive pressure ventilation (NIPPV) and heated, humidified, high flow cannula (HHFNC). Randomised controlled trials (RCTs) of nCPAP versus ventilation have given mixed results, but one demonstrated fewer respiratory problems during infancy. Meta-analysis demonstrated NIPPV rather than nCPAP provided better support post extubation. After extubation or initial support HHFNC has similar efficacy to CPAP. Invasive techniques include those that synchronise inflations with the patients respiratory efforts. Assist control/ synchronised intermittent mandatory ventilation compared to non triggered modes only reduce the duration of ventilation. Further data are required to determine the efficacy of proportional assist ventilation and neurally adjusted ventilatory assist. Other techniques aim to minimise volutrauma. RCTs of volume targeted ventilation demonstrated reductions in BPD and respiratory medication usage at follow-up. Prophylactic high frequency oscillatory ventilation does not reduce BPD, but is associated with superior lung function at school age. Copyright © 2016 Taylor & Francis.

24. Fleeman N, Mahon J, Bates V, Dickson R, Dundar Y, Dwan K, et al. **The clinical effectiveness and cost-effectiveness of heated humidified high-flow nasal cannula compared with usual care for preterm infants: Systematic review and economic evaluation**. Health Technol Assess. 2016;20(30):1-70.
http://dx.doi.org/http://dx.doi.org/10.3310/hta20300
http://www.journalslibrary.nihr.ac.uk/__data/assets/pdf_file/0007/164941/FullReport-hta20300.pdf
Background: Respiratory problems are one of the most common causes of morbidity in preterm infants and may be treated with several modalities for respiratory support such as nasal continuous positive airway pressure (NCPAP) or nasal intermittent positive-pressure ventilation. The heated humidified high-flow nasal cannula (HHHFNC) is gaining popularity in clinical practice. Objective(s): To address the clinical effectiveness of HHHFNC compared with usual care for preterm infants we systematically reviewed the evidence of HHHFNC with usual care following ventilation (the primary analysis) and with no prior ventilation (the secondary analysis). The primary outcome was treatment failure defined as the need for reintubation (primary analysis) or intubation (secondary analysis). We also aimed to assess the cost-effectiveness of HHHFNC compared with usual care if evidence permitted. Data sources: The following databases were searched: MEDLINE (2000 to 12 January 2015), EMBASE (2000 to 12 January 2015), The Cochrane Library (issue 1, 2015), ISI Web of Science (2000 to 12 January 2015), PubMed (1 March 2014 to 12 January 2015) and seven trial and research registers. Bibliographies of retrieved citations were also examined. Review methods: Two reviewers independently screened all titles and abstracts to identify potentially relevant studies for inclusion in the review. Full-text copies were assessed independently. Data were extracted and assessed for risk of bias. Summary statistics were extracted for each outcome and, when possible, data were pooled. A meta-analysis was only conducted for the primary analysis, using fixed-effects models. An economic evaluation was planned. Result(s): Clinical evidence was derived from seven randomised controlled trials (RCTs): Four RCTs for the primary analysis and three RCTs for the secondary analysis. Meta-analysis found that only for nasal trauma leading to a change of treatment was there a statistically significant difference, favouring HHHFNC over NCPAP [risk ratio (RR) 0.21, 95% confidence interval (CI) 0.10 to 0.42]. For the following outcomes, there were no

statistically significant differences between arms: Treatment failure (reintubation < 7 days; RR 0.76, 95% CI 0.54 to 1.09), bronchopulmonary dysplasia (RR 0.92, 95% CI 0.72 to 1.17), death (RR 0.56, 95% CI 0.22 to 1.44), pneumothorax (RR 0.33, 95% CI 0.03 to 3.12), intraventricular haemorrhage (grade >= 3; RR 0.41, 95% CI 0.15 to 1.15), necrotising enterocolitis (RR 0.41, 95% CI 0.15 to 1.14), apnoea (RR 1.08, 95% CI 0.74 to 1.57) and acidosis (RR 1.16, 95% CI 0.38 to 3.58). With no evidence to support the superiority of HHHFNC over NCPAP, a cost-minimisation analysis was undertaken, the results suggesting HHHFNC to be less costly than NCPAP. However, this finding is sensitive to the lifespan of equipment and the cost differential of consumables. Limitation(s): There is a lack of published RCTs of relatively large-sized populations comparing HHHFNC with usual care; this is particularly true for preterm infants who had received no prior ventilation. Conclusion(s): There is a lack of convincing evidence suggesting that HHHFNC is superior or inferior to usual care, in particular NCPAP. There is also uncertainty regarding whether or not HHHFNC can be considered cost-effective. Further evidence comparing HHHFNC with usual care is required. Copyright © Queen's Printer and Controller of HMSO 2016.

25. Dysart KC. **Physiologic Basis for Nasal Continuous Positive Airway Pressure, Heated and Humidified High-Flow Nasal Cannula, and Nasal Ventilation**. Clin Perinatol. 2016;43(4):621-31.
http://dx.doi.org/http://dx.doi.org/10.1016/j.clp.2016.07.001
http://www.elsevier.com/inca/publications/store/6/2/3/3/2/4/index.htt
Noninvasive support modalities have become ever more present in the care of newborns with a wide variety of disease processes. As clinicians have continued to avoid intubation and mechanical ventilation in preterm and term infants, the technologies available to support these groups have grown. Despite this rapid growth they can be broken down into 3 large categories of support, all attempting to deliver both flow and pressure to the nasopharynx supporting both phases of spontaneous breathing. The goal of all of the therapies is to stabilize a heterogeneous group of disorders with some common pathologies and avoid invasive support modalities. Copyright © 2016 Elsevier Inc.

Kvalitetsvurderte enkeltstudier - McMaster

Luo J, Duke T, Chisti MJ, et al. **Efficacy of High-Flow Nasal Cannula vs Standard Oxygen Therapy or Nasal Continuous Positive Airway Pressure in Children with Respiratory Distress: A Meta-Analysis.** J Pediatr. 2019 Dec;215:199-208.e8. doi: 10.1016/j.jpeds.2019.07.059. Epub 2019 Sep 27.
https://bit.ly/2XHp3NQ

Ferguson KN, Roberts CT, Manley BJ, et al. **Interventions to Improve Rates of Successful Extubation in Preterm Infants: A Systematic Review and Meta-analysis.** JAMA Pediatr. 2017 Feb 1;171(2):165-174. doi: 10.1001/jamapediatrics.2016.3015.
https://bit.ly/3agQkt0

Fleeman N, Mahon J, Bates V, et al. **The clinical effectiveness and cost-effectiveness of heated humidified high-flow nasal cannula compared with usual care for preterm infants: systematic review and economic evaluation.** Health Technol Assess. 2016 Apr;20(30):1-68. doi: 10.3310/hta20300.
https://bit.ly/34Kopk3

Før 2016:

Kotecha SJ, Adappa R, Gupta N, et al. **Safety and Efficacy of High-Flow Nasal Cannula Therapy in Preterm Infants: A Meta-analysis.** Pediatrics. 2015 Sep;136(3):542-53. doi: 10.1542/peds.2015-0738. Epub 2015 Aug 17.
https://bit.ly/2wOg0je

Rojas-Reyes MX, Granados Rugeles C, Charry-Anzola LP **Oxygen therapy for lower respiratory tract infections in children between 3 months and 15 years of age.** Cochrane Database Syst Rev. 2014 Dec 10;(12):CD005975. doi: 10.1002/14651858.CD005975.pub3.
https://bit.ly/2KcdDK5

Treff fra søk til fagprosedyre

Kvalitetsvurderte enkeltstudier

McMaster PLUS – (ACP Journal Club (selected via PLUS) og PLUS Studies)

Luo J, Duke T, Chisti MJ, et al. **Efficacy of High-Flow Nasal Cannula vs Standard Oxygen Therapy or Nasal Continuous Positive Airway Pressure in Children with Respiratory Distress: A Meta-Analysis.** J Pediatr. 2019 Dec;215:199-208.e8. doi: 10.1016/j.jpeds.2019.07.059. Epub 2019 Sep 27.
https://bit.ly/2XHp3NQ

Ferguson KN, Roberts CT, Manley BJ, et al. **Interventions to Improve Rates of Successful Extubation in Preterm Infants: A Systematic Review and Meta-analysis.** JAMA Pediatr. 2017 Feb 1;171(2):165-174. doi: 10.1001/jamapediatrics.2016.3015.
https://bit.ly/3agQkt0

Fleeman N, Mahon J, Bates V, et al. **The clinical effectiveness and cost-effectiveness of heated humidified high-flow nasal cannula compared with usual care for preterm infants: systematic review and economic evaluation.** Health Technol Assess. 2016 Apr;20(30):1-68. doi: 10.3310/hta20300.
https://bit.ly/34Kopk3

Før 2016:

Kotecha SJ, Adappa R, Gupta N, et al. **Safety and Efficacy of High-Flow Nasal Cannula Therapy in Preterm Infants: A Meta-analysis.** Pediatrics. 2015 Sep;136(3):542-53. doi: 10.1542/peds.2015-0738. Epub 2015 Aug 17.
https://bit.ly/2wOg0je

Rojas-Reyes MX, Granados Rugeles C, Charry-Anzola LP **Oxygen therapy for lower respiratory tract infections in children between 3 months and 15 years of age.** Cochrane Database Syst Rev. 2014 Dec 10;(12):CD005975. doi: 10.1002/14651858.CD005975.pub3.
https://bit.ly/2KcdDK5

sees «rater comments» under de enkelte innførslene.

Primærstudier Embase

Preel MN, Theiler DML, Greif DMR, Ulmer DMF, Riva DMT. **Improved ventilation during apnoea in children with THRIVE at different flow rates**. Trends in Anaesthesia and Critical Care. 2020;30:e82.
http://dx.doi.org/http://dx.doi.org/10.1016/j.tacc.2019.12.204
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emexb&AN=2005046254
High flow nasal canula therapy (HFNCT), has been shown to prolong safe apnoea time in children during induction of anaesthesia¹. When applied during intubation HFNCT is referred to as transnasal humidified rapid insufflation ventilatory exchange (THRIVE), which postulates to slow PaCO<inf>2</inf> increase during apnoea in adults.² The ventilatory exchange induced by THRIVE in adults has not been reproduced in children.¹ Our Results were challenged by comments that the oxygen flow was too low for children to show a CO<inf>2</inf>-clearance. This ongoing study compares two different flow rates of 100% oxygen while measuring CO<inf>2</inf>-clearance, during 10 min of apnoea in children. Following ethics committee approval and after obtaining informed written consent from parents, this randomised controlled trial compares two groups with 15 patients each: 94. Group 1) HFNCT at 2L/kg/min 100% O<inf>2</inf> - jaw thrust applied Group 2) HFNCT at 4L/kg/min 100% O<inf>2</inf> - jaw thrust applied Our primary hypothesis postulates no difference in CO<inf>2</inf>-clearance between the two flow rates. After standardized anaesthesia induction and neuromuscular blockade, patients are randomized to their investigational group. Once mask ventilation is discontinued, apnoea commences. Transcutaneous CO<inf>2</inf> (tcCO<inf>2</inf>) and near-infrared spectroscopy (NIRS) are measured in addition to standard non-invasive monitoring of vital signs. The study intervention is concluded once either SpO<inf>2</inf> drops to below 95%, tcCO<inf>2</inf> reaches 70mmHg, a drop in NIRS Saturation under 20% from

baseline, or time of apnoea reaches 10 minutes. Data are presented as mean+/-SD. So far, 11 patients have been included (group 1: 6; group 2: 5), aged 27+/-15 months; weight 11.9+/-1.7 kg, four were female. In group 1, the increase of tcCO<inf>2</inf> was 2.6+/-0.7mmHgmin⁻¹; in group 2 it was 2.0+/-0.7mmHgmin⁻¹. In general, the CO<inf>2</inf>-increase in both groups is considerably less precipitous compared to the 4.6mmHgmin⁻¹ found in our previous study¹. These preliminary Results show no difference between the two groups, regarding tcCO<inf>2</inf> clearance rate over 10 min of apnoea. Compared to earlier publications, a "ventilatory effect" appears possible but needs to be confirmed by more data on the use of high flow rates and CO<inf>2</inf> clearance during apnoeic oxygenation in children. 1. Riva T, Pedersen TH, Seiler S, et al. BJA 2018; 120: 592-99. 2. Patel A, Nouraei SA. Anaesthesia 2015; 70: 323-9. Copyright © 2020

Theiler L, Schneeberg F, Riedel T, Kaiser H, Riva T, Greif R. **Apnoeic oxygenation with nasal cannula oxygen at different flow rates in anaesthetised patients: A study protocol for a non-inferiority randomised controlled trial**. BMJ Open. 2019;9(7).
http://dx.doi.org/http://dx.doi.org/10.1136/bmjopen-2018-025442

http://bmjopen.bmj.com/content/early/by/section

Introduction Apnoeic oxygenation using nasal high-flow oxygen delivery systems with heated and humidified oxygen has recently gained popularity in the anaesthesia community. It has been shown to allow a prolonged apnoea time of up to 65 min as CO 2 increase was far slower compared with previously reported data from CO 2 increase during apnoea. A ventilatory exchange due to the high nasal oxygen flow was proposed explaining that phenomenon. However, recent studies in children did not show any difference in CO 2 clearance comparing high-flow with low-flow oxygen. To investigate this ventilatory exchange in adults, we plan this study comparing different oxygen flow rates and the increase of CO 2 during apnoea. We hypothesise that CO 2 clearance is non-inferior when applying low oxygen flow rates. Methods and analysis In this single-centre, single-blinded, randomised controlled trial, we randomly assign 100 patients planned for elective surgery to either control (oxygen 70 L/min, airway opened by laryngoscopy) or one of three intervention groups: oxygen 70, or 10, or 2 L/min, all with jaw thrust to secure airway patency. After anaesthesia induction and neuromuscular blockage, either one of the interventions or the control will be applied according to randomisation. Throughout the apnoea period, we will measure the increase of transcutaneous pCO 2 (tcpCO 2) until any one of the following criteria is met: time=15 min, SpO 2 <92%, tcpCO 2 >10.67 kPa, art. pH <7.1, K + >6.0 mmol/L. Primary outcome is the mean tcpCO 2 increase in kPa/min. Ethics and dissemination After Cantonal Ethic Committee of Bern approval (ID 2018-00293, 22.03.2018), all study participants will provide written informed consent. Patients vulnerable towards hypoxia or hypercarbia are excluded. Study results will be published in a peer-reviewed journal and presented at national and international conferences. Trial registration number This study was registered on www.clinicaltrials.gov (NCT03478774,Pre-results) and the Swiss Trial Registry KOFAM (SNCTP000002861). Copyright © Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

Jeffreys E, Hunt KA, Dassios T, Greenough A. **Diaphragm electromyography results at different high flow nasal cannula** flow rates. Eur J Pediatr. 2019;178(8):1237-42.
http://dx.doi.org/http://dx.doi.org/10.1007/s00431-019-03401-z
https://rd.springer.com/journal/431
Heated, humidified, high-flow nasal cannula (HHHFNC) is increasingly being used, but there is a paucity of evidence as to the optimum flow rates in prematurely born infants. We have determined the impact of three flow rates on the work of breathing (WOB) assessed by transcutaneous diaphragm electromyography (EMG) amplitude in infants with respiratory distress or bronchopulmonary dysplasia (BPD). Flow rates of 4, 6 and 8 L/min were delivered in random order. The mean amplitude of the EMG trace and mean area under the EMG curve (AEMGC) were calculated and the occurrence of bradycardias and desaturations recorded. Eighteen infants were studied with a median gestational age of 27.8 (range 23.9-33.5) weeks and postnatal age of 54 (range 3-122) days. The median flow rate prior to the study was 5 (range 3-8) L/min and the fraction of inspired oxygen (FiO<inf>2</inf>) was 0.29 (range 0.21-0.50). There were no significant differences between the mean amplitude of the diaphragm EMG and the AEGMC and the number of bradycardias or desaturations between the three flow rates. Conclusion(s): In infants with respiratory distress or BPD, there was no advantage of using high (8 L/min) compared with lower flow rates (4 or 6 L/min) during support by HHHFNC.What is known:* Humidified high flow nasal cannulae (HHHFNC) is increasingly being used as a non-invasive form of respiratory support for prematurely born infants.* There is a paucity of evidence regarding the optimum flow rate with 1 to 8 L/min being used.What is new:* We have assessed the work of breathing using the amplitude of the electromyogram of the diaphragm at three HHHFNC flow rates in infants with respiratory distress or BPD.* No significant differences were found in the EMG amplitude results or the numbers of bradycardias or desaturations at 4, 6 and 8 L/min. Copyright © 2019, The Author(s).

Treff fra søk til fagprosedyre

Hough JL, Shearman AD, Jardine L, Caldararo D, Schibler A. **Effect of randomization of nasal high flow rate in preterm infants**. Pediatr Pulmonol. 2019;54(9):1410-6.
http://dx.doi.org/http://dx.doi.org/10.1002/ppul.24418
http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-0496
Objective: To assess the effect of nasal high flow (NHF) cannula on end-expiratory level (EEL), continuous distending pressure (CDP) and regional ventilation distribution in preterm infants. Design(s): A prospective observational clinical study with randomly applied NHF rates. Patients and Setting: Preterm infants requiring continuous positive airway pressure (CPAP) respiratory support in a Neonatal Intensive Care Unit. Intervention(s): Infants were measured on randomly applied flow rates at 2, 4, and 6 L/min of NHF and compared with bubble CPAP. Measurements and Results: Regional ventilation distribution and EEL were measured using electrical impedance tomography (EIT) and respiratory inductance plethysmography (RIP) in 24 preterm infants (31.19 +/- 1.17 weeks corrected age). Changes in CDP were measured from the esophagus via the nasogastric tube. Physiological variables were also recorded. There were no differences in ventilation distribution, EEL or CDP between CPAP and NHF (P >.05). However, the physiological variables of FiO<inf>2</inf> (P =.01) and SpO<inf>2</inf>/FiO<inf>2</inf> (P <.01) were improved on CPAP compared with NHF. Conclusion(s): NHF applied in random order with flow rates between 2 to 6 L/min was equally as good as CPAP in maintaining EEL and ventilation distribution in stable preterm infants. Overall oxygenation was better on CPAP compared to NHF. Copyright © 2019 Wiley Periodicals, Inc.

Sarkar M, Sinha R, Roychowdhoury S, Mukhopadhyay S, Ghosh P, Dutta K, et al. **Comparative study between noninvasive continuous positive airway pressure and hot humidified high-flow nasal cannulae as a mode of respiratory support in infants with acute bronchiolitis in pediatric intensive care unit of a Tertiary Care Hospital.** Indian J Crit Care Med. 2018;22(2):85-90.
http://dx.doi.org/http://dx.doi.org/10.4103/ijccm.IJCCM_274_17
http://www.ijccm.org/
Background: Early initiation of appropriate noninvasive respiratory support is utmost important intervention to avoid mechanical ventilation in severe bronchiolitis. Aim(s): This study aims to compare noninvasive continuous positive airway pressure (nCPAP) and hot humidified high-flow nasal cannulae (HHHFNC) as modes of respiratory support in infants with severe bronchiolitis. Method(s): Prospective, randomized, open-label pilot study done in a tertiary-care hospital Pediatric Intensive Care Unit (PICU). Participant(s): 31 infants (excluding neonates) clinically diagnosed with acute bronchiolitis having peripheral capillary oxygen saturation (SpO<inf>2</inf>) <92% (with room air oxygen); Respiratory Distress Assessment Index (RDAI) >=11. Intervention(s): nCPAP (n = 16) or HHHFNC (n = 15), initiated at enrollment. Primary Outcome: Reduction of need of mechanical ventilation assessed by improvements in (i) SpO<inf>2</inf>% (ii) heart rate (HR); respiratory rate; (iii) partial pressure of carbon dioxide; (iv) partial pressure of oxygen; (v) COMFORT Score; (vi) RDAI from preintervention value. Secondary outcome: (i) total duration of noninvasive ventilation support; (ii) PICU length of stay; and (iii) incidence of nasal injury (NI). Result(s): Mean age was 3.41 +/- 1.11 months (95% confidence interval 2.58-4.23). Compared to nCPAP, HHHFNC was better tolerated as indicated by better normalization of HR (P < 0.001); better COMFORT Score (P < 0.003) and lower incidence of NI (46.66% vs. 75%; P = 0.21). Improvements in other outcome measures were comparable for both groups. For both methods, no major patient complications occurred. Conclusion(s): HHHFNC is an emerging alternative to nCPAP in the management of infants with acute bronchiolitis. Copyright © 2018 Indian Journal of Critical Care Medicine Published by Wolters Kluwer - Medknow.

Milesi C, Pierre AF, Deho A, Pouyau R, Liet JM, Guillot C, et al. **A multicenter randomized controlled trial of a 3-L/kg/min versus 2-L/kg/min high-flow nasal cannula flow rate in young infants with severe viral bronchiolitis (TRAMONTANE 2).** Intensive Care Med. 2018;44(11):1870-8.
http://dx.doi.org/http://dx.doi.org/10.1007/s00134-018-5343-1
http://link.springer.de/link/service/journals/00134/index.htm
Purpose: High-flow nasal cannula (HFNC) therapy is increasingly proposed as first-line respiratory support for infants with acute viral bronchiolitis (AVB). Most teams use 2 L/kg/min, but no study compared different flow rates in this setting. We hypothesized that 3 L/kg/min would be more efficient for the initial management of these patients. Method(s): A randomized controlled trial was performed in 16 pediatric intensive care units (PICUs) to compare these two flow rates in infants up to 6 months old with moderate to severe AVB and treated with HFNC. The primary endpoint was the percentage of failure within 48 h of randomization, using prespecified criteria of worsening respiratory distress and discomfort. Result(s): From November 2016 to March 2017, 142 infants were allocated to the 2-L/kg/min (2L) flow rate and 144 to the 3-L/kg/min (3L) flow rate. Failure rate was comparable between groups: 38.7% (2L) vs. 38.9% (3L; p = 0.98). Worsening respiratory distress was the most common cause of failure in both groups: 49% (2L) vs. 39% (3L; p = 0.45). In the 3L group, discomfort was more frequent (43%

Treff fra søk til fagprosedyre

vs. 16%, p = 0.002) and PICU stays were longer (6.4 vs. 5.3 days, p = 0.048). The intubation rates [2.8% (2L) vs. 6.9% (3L), p = 0.17] and durations of invasive [0.2 (2L) vs. 0.5 (3L) days, p = 0.10] and noninvasive [1.4 (2L) vs. 1.6 (3L) days, p = 0.97] ventilation were comparable. No patient had air leak syndrome or died. Conclusion(s): In young infants with AVB supported with HFNC, 3 L/kg/min did not reduce the risk of failure compared with 2 L/kg/min. This clinical trial was recorded on the National Library of Medicine registry (NCT02824744). Copyright © 2018, Springer-Verlag GmbH Germany, part of Springer Nature and ESICM.

Christophe M, Florence PA, Anne D, Robin P, Jean-Michel L, Camille G, et al. **Can a flow rate of 3 L/kg/min, compared to 2 L/kg/min, reduce the risk of failure during the initial management of acute viral bronchiolitis with high flow nasal cannulae: A randomized controlled trial (TRAMONTANE 2 study).** Annals of Intensive Care Conference: French Intensive Care Society, International Congress Reanimation. 2018;8(1 Supplement 1). http://dx.doi.org/http://dx.doi.org/10.1186/s13613-017-0345-7
http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=emed19&AN=620837164
Introduction: HFNC is currently proposed as first-line respiratory support in moderate to severe acute viral bronchiolitis (AVB) in infants. However, the flow setting remains empiric, 2 L/kg/min being used by most teams. Considering the failure rate observed with this device, as high as 50% in some studies, we hypothesized that a higher flow rate may improve this issue. The purpose of the present study was to compare the failure rates with two flow regimen-2 L/kg/min versus 3 L/kg/ min. Patients and Methods: A randomized controlled study was performed in 16 French Pediatric Intensive Care Units (PICUs). Infants younger than 6 months-old with moderate to severe AVB, defined by Wood-modified Clinical Asthma score (mWCAs) > 3, were randomly allocated to HFNC treatment with a flow rate of 2 L/kg/min or 3 L/ kg/min for 48 h. The primary endpoint was the percentage of failure, defined as the occurrence of one or more of the following-increase in mWCAs or RR, increase in discomfort (EDIN score), and severe apnea episodes. Result(s): 287 infants with mean (SD) age and weight of 47 (58) days and 4460 (1130) g were included from November 2016 to March 2017. At baseline, RR was 58 (16) rpm, mWCAs 4.5(1), FiO2 32 (13) %, PCO<inf>2</inf> 59 (13) mmHg, pH 7.26 (0.1). 142 were included in the 2 L/kg/min group and 145 in the 3 L/kg/min group. No difference was observed between groups for baseline characteristics. Failure rate was not different between groups-38.7 vs 39.3% + p = 0.92. No center effect was observed for failure. Discomfort was more frequent in the 3 L kg min group-7 vs 17% + p = 0.006. The length of stay was shorter in the 2 L kg min group-5.3 (2.8) vs 6.4 (5) days + p = 0.048. Intubation occurred in 4 142 patients in the 2 L/kg/min group vs 10 145 patients in the 3 L kg min group (p = 0.12). Conclusion(s): HFNC with a flow rate of 3 L/kg/min did not reduce the risk of failure compared to 2 L/kg/min at the initial respiratory management of AVB in young infants.