F&P Optiflow

Flow Matters

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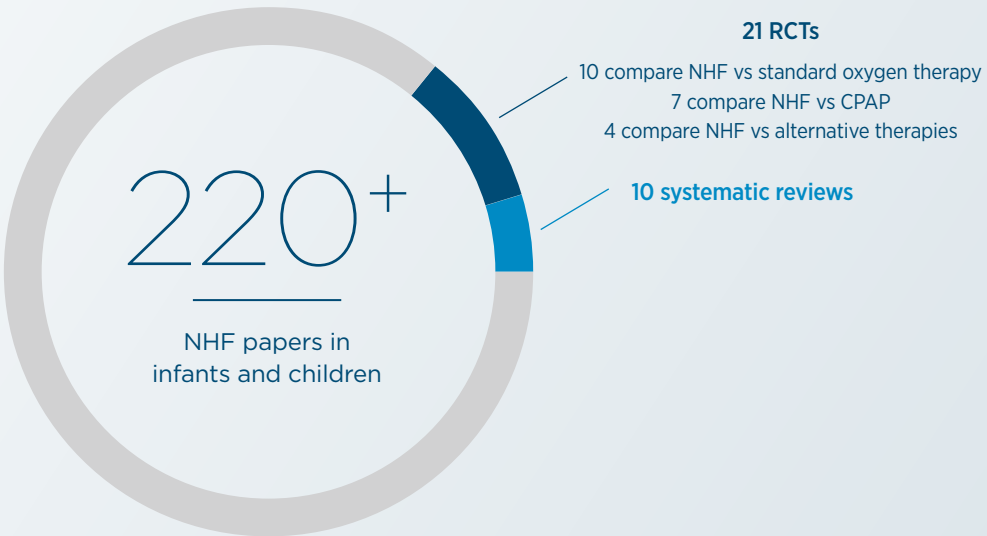
Early use of NHF in infants and children

Summary

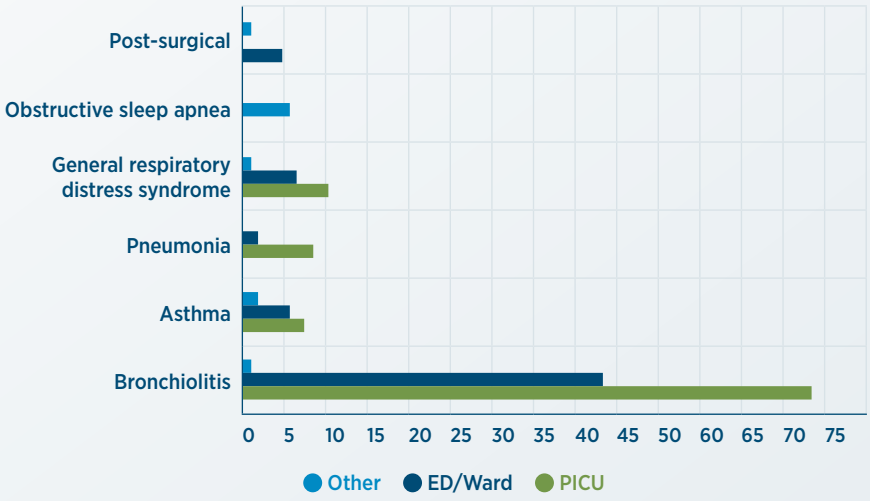
- NHF therapy is well established in pediatric care areas across the hospital, including the PICU, ED and other general care areas.[1]
- Early initiation of NHF at 2 L/kg/min is associated with improved physiological outcomes and is shown to reduce escalation of care in patients with bronchiolitis.[1-11]
- The use of NHF as a primary treatment for infants with bronchiolitis in the ED resulted in a significantly lower rate of therapy failure compared with standard oxygen therapy.[1]

Review of the literature

A systematic search of the available literature shows there are over 220 peer-reviewed papers investigating the use of nasal high flow (NHF) therapy in infants and children. These figures exclude papers investigating the use of NHF in the neonatal population. Of these, 21 are randomized controlled trials (RCTs) – 10 of which compared NHF with standard oxygen therapy, seven with continuous positive airway pressure (CPAP) and four with alternative treatments. A further 10 are in the form of systematic reviews.



These studies represent application of NHF therapy in infants and children in a range of respiratory conditions in the pediatric intensive care unit (PICU), emergency department (ED) and other general care areas in the hospital.



The body of literature helps to define the role of NHF in pediatric respiratory care and supports:

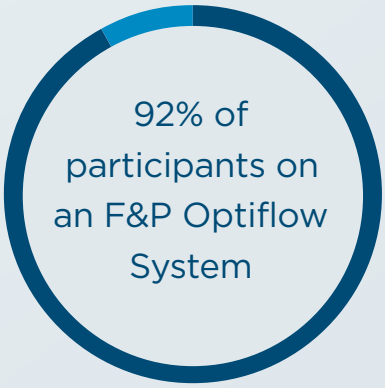
- **the use of NHF early in the course of respiratory distress, which is associated with improved physiological outcomes compared with standard oxygen therapy, including:** [1–6]
    - improved breathing patterns and rapid unloading of respiratory muscles
    - significant reduction in the work of breathing
    - rapid improvement to respiratory distress
    - improved mucosal function and secretion clearance through the delivery of heated and humidified gas
- **the early use of NHF outside of the PICU can lead to reduced intubation rates and PICU admissions.**[5, 7–11]

Use of F&P Optiflow™ systems in RCTs

The weight of evidence is from studies which used an F&P Optiflow system, including an F&P Optiflow Junior interface and an F&P humidity delivery system.

17 out of 21 RCTs used an F&P Optiflow System

The systematic review conducted showed that 17 out of 21 RCTs (81%) used an F&P Optiflow system.



Of the 3,156 total participants on NHF in RCTs, 2,921 participants (92%) were treated using an F&P Optiflow system.

F&P Optiflow Systems Other Systems

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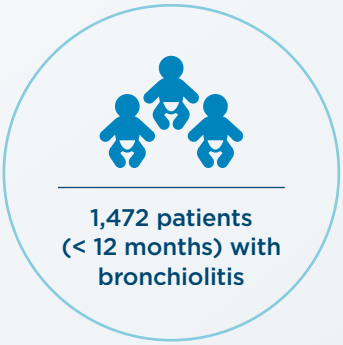
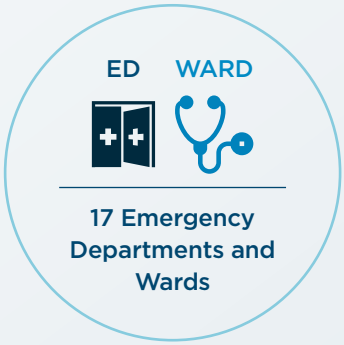
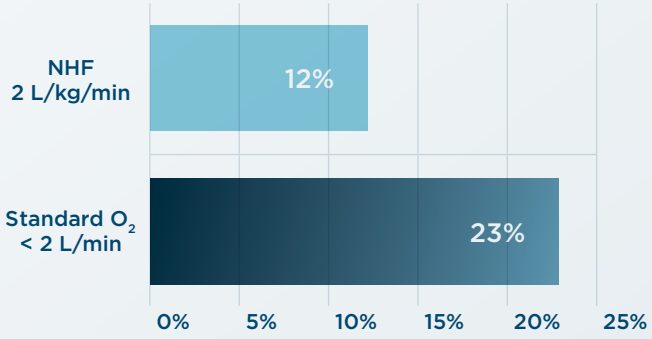
Landmark Study

The largest NHF RCT was conducted by Franklin et al.[1] This multi-center RCT supports the use of NHF in the ED and general care areas in young infants with bronchiolitis, and used the F&P Airvo™ with an Optiflow Junior interface.



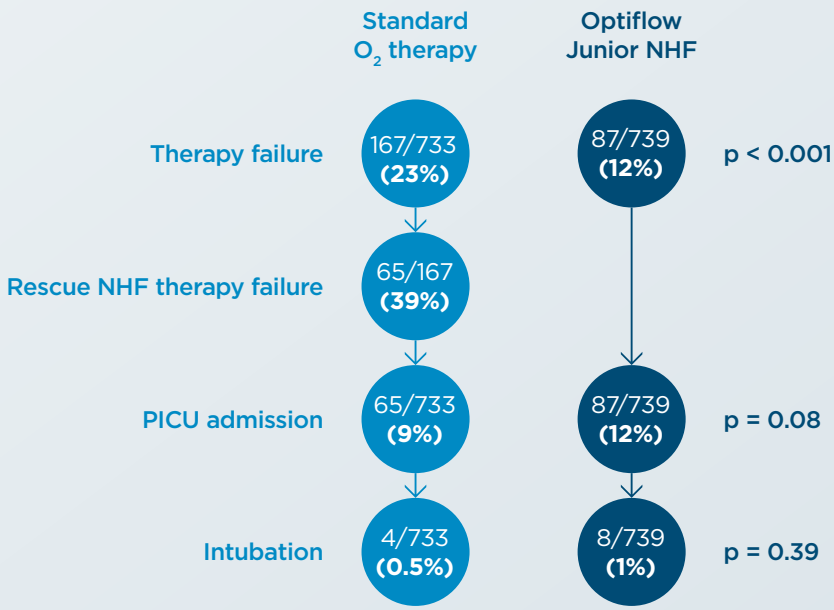


The primary outcome of the study was that the use of NHF at 2 L/kg/min as a primary treatment in the ED and general care areas resulted in a significantly lower rate of therapy failure compared with standard oxygen therapy (12 vs. 23%, p < 0.001). Therapy failure was defined as an escalation of therapy or PICU admission.



Therapy failure (%) in patients who received NHF at 2 L/kg/min vs. those who received standard oxygen therapy

There were no significant differences between the secondary outcomes (PICU admissions, intubation rates and adverse events). It is important to note, the study design allowed patients on standard oxygen therapy that met the therapy failure criteria to escalate to NHF. 61% of the patients that failed standard oxygen therapy were rescued by NHF and avoided PICU admission.



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An evidence-based approach to implementation of NHF in pediatric patients

This information collates data from published guidelines and the body of evidence. It does not overrule expert clinical judgment in individual patient management.

Flows

- **2 L/kg/min for patients up to 12 kg** in weight has been shown to produce a rapid improvement in respiratory distress, and a reduced need for escalation of therapy.
- Flow rates for those over 12 kg have been protocolized by the PARIS 2 research group.[12]

Weight	Flow Rate
Up to 12 kg	2 L/kg/min
13–15 kg	30 L/min
16–30 kg	35 L/min
31–50 kg	40 L/min
>50 kg	50 L/min

Humidity

Heating and humidification of gases during respiratory support (including NHF and standard oxygen therapy):

- enables maintenance of airway defenses and mucociliary transport
- promotes efficient gas exchange
- reduces respiratory effort for the patient
- enables conservation of energy for growth and development.

O_2

- The PARIS 2 protocol suggests that NHF be initiated at a set fraction of inspired oxygen (FiO_2) of 21% (room air).
- If oxygen saturation (SpO_2) is < 85% or remains at < 92% after 10 minutes of therapy initiation, then the FiO_2 should be increased and titrated to achieve target SpO_2 (≥ 92%).

Monitoring

- Non-responders can be identified within the first 60 minutes of NHF initiation, by the monitoring of physiological parameters such as heart rate, respiratory rate, and work of breathing.

Weaning off NHF therapy

- Reduce the FiO_2 to maintain SpO_2 at target levels without reducing flow.
- Once the FiO_2 has been reduced to 21% (room air) and the patient is stable at this concentration, NHF therapy can be stopped.

Definitions

F&P Optiflow System: An F&P system developed for the delivery of NHF. An F&P Optiflow interface (e.g., F&P Optiflow Junior 2) with either:

- an integrated flow source, humidifier and breathing set (e.g., F&P Airvo™ with AirSpiral™ tube and chamber kit)
- a separate flow source combined with an F&P humidifier and breathing set (e.g., MR850 and RT-series circuit kit).

Infants and Children: This search included literature concerning the use of NHF in infants and children only, defined by the US Food and Drug Administration (FDA) as between 1 month to 2 years postnatal age and 2 to 12 years of age, respectively. Papers regarding the use of NHF in neonates (birth to 1 month postnatal) were not included, as indications for NHF are different in this population.

Nasal High Flow (NHF): NHF is a mode of noninvasive respiratory support that delivers high flows of heated and humidified blended air and oxygen through an unsealed nasal interface.

Standard oxygen therapy: A form of oxygen therapy that is delivered through a nasal cannula at low flow rates (< 2 L/min) and is typically unheated and unhumidified. May also be referred to as conventional oxygen therapy.

Systematic search of the available literature: Conducted on July 21, 2021 using predefined search terms on PubMed, Embase & Cochrane Library, with data extraction and screening performed via DistillerSR (Evidence Based Partners, Ottawa, Ontario) by internal F&P clinical researchers.

For further information, please visit https://www.fphcare.com/hospital/infant-respiratory/nasal-high-flow/ or click on the hyperlinked references below.

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