Nasal High-Flow Therapy for Preterm Infants

Review of Neonatal Trial Data

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KEYWORDS

• Infant, premature • Intensive care, neonatal • Continuous positive airway pressure • Respiratory distress syndrome, newborn

KEY POINTS

- There is insufficient evidence for nasal high-flow (HF) use as primary respiratory support for preterm infants.
- HF is equivalent to nasal continuous positive airway pressure (CPAP) as postextubation support for preterm infants, but there are limited data available in extremely preterm infants born less than 28 weeks' gestation.
- There is insufficient evidence to recommend using HF to wean from CPAP in preterm infants with evolving or established bronchopulmonary dysplasia.
- HF may prolong the duration of respiratory support for preterm infants when used in place of CPAP, but does not seem to increase the risk of bronchopulmonary dysplasia.
- HF use reduces rates of nasal trauma in preterm infants compared with CPAP, and does not increase the risk of pneumothorax.

INTRODUCTION

Nasal continuous positive airway pressure (CPAP) is a mainstay of noninvasive respiratory support for preterm infants, and has been well studied in clinical trials. Although its benefits are well recognized, effective application of CPAP in preterm infants requires highly skilled nursing care because of the bulky interfaces used and the need to minimize leak. CPAP use in preterm infants has been associated with pneumothorax,[1]

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gaseous abdominal distention,[2] and nasal injury.[3,4] Simpler, gentler alternatives are sought.

Heated, humidified, nasal high-flow (HF; **Fig. 1**) therapy has become a popular mode of noninvasive respiratory support for infants and children with respiratory illnesses.[5–7] In neonatology, HF use in developed countries has dramatically increased in the last 6 years.[8–11] The Australian and New Zealand Neonatal Network recently reported that more than half of very preterm infants born less than 30 weeks' gestation had received treatment with HF.[12] HF systems (**Fig. 2**) used in randomized trials in preterm infants, such as the Precision Flow (Vapotherm Inc, Exeter, NH) and Optiflow Junior (Fisher and Paykel Healthcare, Auckland, New Zealand) systems, heat and humidify the delivered gas, and are able to blend oxygen and air.

In addition to accumulating evidence of efficacy and safety, the increasing use of HF to treat preterm infants is also because of other perceived benefits over CPAP. These include the simpler interface, which is described as easier to apply than CPAP, and has been shown to be more comfortable for infants[13] and preferred by parents[14] and nurses.[15] Should HF be shown to be a safe and effective alternative to CPAP, particularly as primary respiratory support after admission to the nursery, it is a promising therapy for nontertiary settings and potentially in developing countries.

Although HF has become rapidly integrated into neonatal intensive care, it is only in the last few years that evidence from larger randomized clinical trials of HF has become available. This article discusses the evidence for HF use in preterm infants compared with other noninvasive supports from these trials for different clinical indications.

NASAL HIGH-FLOW AS EARLY RESPIRATORY SUPPORT FOR PRETERM INFANTS

Stabilization in the Delivery Room

There are no published randomized trials of HF use in the delivery room. However, Reynolds and colleagues[16] recently published a case series of 28 preterm infants born less than 30 weeks' gestation who were stabilized with HF. This was a single-center study in

Fig. 1. A preterm infant treated with Optiflow Junior (Fisher and Paykel Healthcare, Auckland, New Zealand) nasal high-flow therapy.