

Heated Humidified High-Flow Nasal Cannula: Impact on Neonatal Outcomes

The use of heated humidified high-flow nasal cannula (HFNC) as an alternative to CPAP in neonates has increased in recent years and seems to have gone viral.¹ HFNC as a method of respiratory support to aid in extubation has increased in popularity following randomized controlled trials showing no difference in extubation failure rates or other outcomes between HFNC and CPAP in neonates at >26 weeks' gestation.²⁻⁴ Campbell et al,⁵ however, have shown CPAP to be superior.

HFNC is now used for reasons other than as a method to aid in extubation and as an alternative to CPAP. This is because of the impression that HFNC is easier to use in terms of application and maintenance, there is less nasal trauma, and infant tolerance is good.^{1,6,7} However, unpredictable distending pressures during HFNC raise justifiable concerns. Studies, although inconsistent and highly variable, have demonstrated pressures as high as 6 cm H₂O with a flow as low as 2 L/min in neonates.^{8,9} A randomized controlled trial revealed that weaning neonates from CPAP to HFNC was associated with an increased oxygen exposure and duration of respiratory support.¹⁰ Other cohort studies similarly reported an increased duration of respiratory support and chronic lung disease in the post-HFNC era and hypothesized that variable distending pressures may promote progressive atelectasis,¹¹ whereas a more recent publication also showed a higher risk of death or chronic lung disease/bronchopulmonary dysplasia, increased respiratory morbidities, delayed oral feeding, and increased length of stay.¹² This increased respiratory support was also confirmed in a Cochrane review, but there was no increase in chronic lung disease.¹³

In this issue of *RESPIRATORY CARE*, a retrospective study by Hoffman et al¹⁴ of 163 neonates at <33 weeks' gestation compared 2 eras of respiratory management, the first from April 2011 to April 2012 (pre-HFNC era) and the second from August 2012 to August 2013 (post-HFNC era). The results led the investigators to reassess their use of HFNC. With the introduction of HFNC in 2012, 68% of neonates received HFNC, and of those who received HFNC,

95% also received CPAP. The use of HFNC often followed CPAP, suggesting a preference for HFNC during the weaning period rather than an alternative method for primary respiratory support.

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There were no significant differences in baseline characteristics between the pre- and post-HFNC groups; nor was there any difference in the duration of mechanical ventilation or failed extubation attempts.¹⁴ Consequently, any difference in outcomes was more likely attributable to the mode of respiratory support. The post-HFNC group had significantly higher rates of retinopathy of prematurity (25% vs 43%) and a nonsignificant trend toward higher rates of bronchopulmonary dysplasia (35% vs 49%). The post-HFNC group was significantly more likely to be discharged with home oxygen (26% vs 45%). The post-HFNC neonates received a significantly longer duration of mid-level support (CPAP plus HFNC: 15 d vs 24 d) with a delay in the transition to low flow nasal cannula (33 d vs 52 d). When the post-HFNC group was split into those who did and did not receive HFNC, a significant difference in the length of stay emerged (72 d vs 47 d). The post-HFNC group was less likely to be on full oral feeds at discharge (42% vs 73%) and more likely to be transferred to an intermediate care facility than to be discharged home.

This study by Hoffman et al¹⁴ is now the third publication since 2015 to show increased morbidities, including retinopathy of prematurity, chronic lung disease/bronchopulmonary dysplasia, increased time to reach full feeds, and increased length of stay in neonates who have received HFNC as part of their respiratory care. It is now imperative to take stock and review the implementation and weaning protocols for HFNC in preterm neonates, especially the very premature at <28 weeks' gestation.

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