

Improved Oxygenation *and* Increased Comfort: A Great Combination

Devices for oxygen therapy in adults have been largely unchanged since the mid 1970s when I graduated from respiratory therapy school. Recently, however, the high-flow nasal cannula (HFNC) with heated humidification became available. My first experience with HFNC was in a patient with pulmonary fibrosis. This patient refused to have the HFNC exchanged to a nonbreathing mask because his dyspnea increased when the devices were switched. I found this surprising because the nonbreathing mask has historically been used to deliver the highest fraction of inspired oxygen (F_{IO_2}) of all oxygen therapy devices.¹

The flow from an adult-size nasal cannula had been limited to 6 L/min, and it was suggested that a higher flow would increase the delivered oxygen concentration very little and cause nasal mucosal irritation due to drying.¹ HFNC is new enough that it was not mentioned until the latest editions of respiratory therapy textbooks.²

Wettstein et al³ measured the F_{IO_2} delivered from low-flow nasal cannula and HFNC in normal subjects, and reported a maximum F_{IO_2} of about 0.75 at flows up to 15 L/min. The HFNC can also provide a small amount of continuous positive airway pressure that may also improve oxygenation.⁴ This has been reported in pediatric and adult patients.⁵ Other mechanisms of benefit from HFNC may include flushing of the nasopharyngeal dead space, reduced nasal resistance, and reduced energy associated with gas conditioning.⁶

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In this issue of *RESPIRATORY CARE*, Roca et al⁷ report their comparison of an HFNC and a simple oxygen mask and bubble humidifier in 20 patients with acute respiratory failure. Oxygen delivery with the oxygen mask could be supplemented with a nasal cannula if needed. They compared P_{aO_2} , vital signs, dyspnea, mouth dryness, and patient comfort. Patients served as their own controls. The HFNC provided better oxygenation than the mask or mask/cannula combination at average flows of 30 L/min and 15 L/min, respectively, and the patients preferred HFNC to mask or mask/cannula. A recent case report in *RESPIRATORY CARE*⁸ also reported good tolerance of HFNC in a patient with dementia, which supports the comfort of HFNC, similar to the findings of Roca et al.⁷

Further work is needed to identify HFNC's role in respiratory care. Who are the appropriate patients for HFNC? Given the higher cost of HFNC equipment, it is important that patients are appropriately chosen and that HFNC is not

used indiscriminately. It is also important to further evaluate HFNC's mechanism of benefit. Is it the higher flow, which increases F_{IO_2} ? Is it the heated humidity, which improves patient comfort? Is it flushing of carbon dioxide from the upper airway, which reduces the minute volume requirement? Is it an effect of the continuous positive airway pressure from the high flow, which improves alveolar recruitment, counterbalances intrinsic positive end-expiratory pressure, and improves cardiac function? Answers to these questions will help identify the appropriate patients for HFNC.

Oxygen therapy devices do little good if the patients won't wear them. The HFNC provides the physician and respiratory therapist with a device that may combine improved oxygenation with greater patient comfort and adherence. The study by Roca et al⁷ suggests that HFNC may be an important addition to our armamentarium to improve oxygenation in a way that may be better accepted by some patients.

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