

KEY ADVANCES PRACTICE ADVANCE

High-Flow Nasal Cannula for Acute Hypoxemic Respiratory Failure

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Why is this topic important? Acute hypoxemic respiratory failure is common in adults presenting to the emergency department (ED). An ideal means of respiratory support would be noninvasive, reduce the rate of intubation, and improve mortality.

How will this change my clinical practice? Studies comparing high-flow nasal cannula (HFNC) with facemask and noninvasive positive pressure ventilation (NIPPV) have shown that, among patients with nonhypercapnic acute hypoxemic respiratory failure, mortality is lower with high-flow oxygen.

Synopsis Focus Points: HFNC should be the first-line noninvasive respiratory support for patients without chronic obstructive pulmonary disease (COPD) presenting in acute hypoxemic respiratory failure.

Background:

NIPPV has been shown to be effective at preventing intubation and improving outcomes in patients with acute hypercapnic or hypercapnic and hypoxemic respiratory failure. This is especially true with COPD and cardiogenic pulmonary edema, but its use is controversial when respiratory failure is secondary to other etiologies.

HFNC allows the clinician to provide a set fraction of inspired oxygen (FiO_2), as well as a set flow of air (often at 30-60 L/min). This high-flow modality provides ample oxygen and generates a mild positive end expiratory pressure effect, both of which improve oxygenation. (1,2) HFNC has also been shown to reduce the work of breathing, reduce respiratory rate, and improve oxygenation in critically ill patients. (3)

A seminal randomized trial published in 2015 compared HFNC, NIPPV, and standard oxygen among 310 patients with hypoxemic respiratory failure. (4) The hazard ratio (HR) for death at 90 days was higher among those receiving standard oxygen (HR = 2.01; 95% CI 1.01 to 3.99) and NIPPV (HR = 2.50; 95% CI 1.31 to 4.78) versus HFNC. The differences in the rates of intubation did not reach statistical significance (i.e., 38% HFNC, 47% standard oxygen, and 50% NIPPV).

A meta-analysis of ED patients with acute hypoxemic respiratory failure found that, compared with patients who were supported with conventional oxygen therapy, those treated with HFNC therapy had a reduced need for escalation to intubation (risk ratio = 0.41; 95% CI 0.22 to 0.78), reduced dyspnea, and increased comfort. The mortality rate, intensive care unit admission rate, and ED and hospital lengths of stay were not significantly different. These findings support HFNC as a first-line respiratory intervention in adult patients with nonhypercapnic hypoxemic respiratory failure. (5)

This is level 1a evidence. (6)

References:

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[https://www.bjanaesthesia.org/article/S0007-0912\(17\)33885-0/fulltext](https://www.bjanaesthesia.org/article/S0007-0912(17)33885-0/fulltext)
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4. Frat J-P, Thille AW, Mercat A, et al. High-flow oxygen through nasal cannula in acute hypoxemic respiratory failure. *N Engl J Med*. 2015;372(23):2185-2196. doi:10.1056/NEJMoa1503326
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5. Huang CC, Lan HM, Li CJ, et al. Use high-flow nasal cannula for acute respiratory failure patients in the emergency department: a meta-analysis study. *Emerg Med Int*. 2019;2019:1-10. doi:10.1155/2019/2130935
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6. Oxford Centre for Evidence-Based Medicine: Levels of Evidence (March 2009). Centre for Evidence-Based Medicine.
<https://www.cebm.ox.ac.uk/resources/levels-of-evidence/oxford-centre-for-evidence-based-medicine-levels-of-evidence-march-2009>

Resources for additional learning:

<https://emcrit.org/pulmcrit/pulmcrit-does-the-high-trial-debunk-high-flow-nasal-cannula/>

<https://www.thesgem.com/2015/11/sgem135-the-answer-my-friend-is-blowin-in-your-nose-high-flow-nasal-oxygen/>