

NPPV in Acute Respiratory Failure: Is It Time to Reconsider Where It May Be Applied?

The use of noninvasive positive-pressure ventilation (NPPV) as a means of ventilatory support has been around for as long as the profession of respiratory care. In fact, for a substantial part of my career, noninvasive positive-pressure treatments were the primary therapeutic activity provided by respiratory therapists. In the mid-1960s many of the first patients I mechanically ventilated were ventilated noninvasively. Of course, we did not have the equipment or the knowledge we have today, and the use of continuous NPPV as life support for patients with acute respiratory failure stopped with the introduction of volume ventilators that could provide assisted ventilation.

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As is true in many aspects of medicine, we reinvented the use of NPPV for life support in the late 1980s. The article by Meduri et al¹ in 1989, which discussed the use of NPPV via an intensive-care-unit (ICU) ventilator as a method of continuous ventilatory support, again piqued our interest in this form of ventilation. Since that landmark article, scores of randomized controlled trials have addressed every aspect of the provision of NPPV in acute care.² In fact, in my opinion, there is more support in the literature for the use of noninvasive ventilatory support techniques, including both NPPV and continuous positive airway pressure, than for anything else that we do in respiratory care.

It is interesting to reflect on the consensus conference statement on NPPV published in *RESPIRATORY CARE* now almost 10 years ago and compare what we said then to what we do now!³ In 1997 we discussed the use of NPPV to manage exacerbations of chronic obstructive pulmonary disease (COPD), patients with cardiogenic pulmonary edema, patients with neuromuscular and chest-wall disease, and patients with severe asthma. Little was discussed regarding patients with “do-not-intubate” status, patients with acute hypoxemic respiratory failure, or patients who either failed weaning or were at risk of failing extubation. Today a number of clinical trials have addressed each of those subjects, and the scope of NPPV application over this 10-year period has greatly increased.⁴⁻⁹ It was also recommended in the consensus document that NPPV for acute respiratory failure be applied in the ICU or emergency ward and potentially in specialty step-down units or respiratory wards.

In this issue of *RESPIRATORY CARE* a dramatic change in the location where NPPV should be used is advocated. Farha et al,¹⁰ at the Cleveland Clinic, present their experience with the use of NPPV outside the ICU, on regular hospital wards. They reported that, of 62 patients in whom NPPV was initiated on the wards, 19 required movement into the ICU. Of the 19 transferred to the ICU, 12 required immediate intubation. All of the 43 remaining on the wards survived, and 8 of the 19 transferred to the ICU died. In addition, Farha et al report on 14 do-not-intubate patients, all of whom were managed on the wards and 7 of whom died during their hospitalization.

Most of the current literature, discussed in detail by Farha and colleagues,¹⁰ on the use of NPPV for acute respiratory failure has been from the ICU. However, reports from England have clearly supported the use of NPPV in patients with COPD exacerbations on the wards.^{11,12} Both Bott et al¹¹ and Plant et al¹² reported successful use of NPPV outside the ICU. A recent large case series of do-not-intubate patients at the Massachusetts General Hospital also supports the use of NPPV in the wards for do-not-intubate patients.¹³ In addition, recent survey data indicate that increasing numbers of patients are managed with NPPV outside of the ICU.^{14,15} Part of the reason for this is the high ICU occupancy rate, but also the increased comfort on the part of all practitioners with the use of NPPV as life support.

The major controversy regarding the use of NPPV for acute respiratory failure on the wards has to do with an institution’s ability to provide safe, effective care similar to the level these patients receive in the ICU. Specifically, all involved in the care of these patients should be very familiar with and skilled in the application of NPPV. In addition, patients should be alert, cooperative, and monitored in a manner that is equivalent to that in the ICU. All should receive cardiac monitoring and pulse oximetry; the ventilator used should be appropriately alarmed, with alarm annunciation outside the patient’s room. Regardless of the ventilator used, it should be connected to the nurse call system so that ventilator failure or discontinuation would be annunciated outside the patient’s room.

In addition, the patient’s clinical status must be considered. However, Farha et al¹⁰ did not find many specific clinical features associated with an immediate need for admission to the ICU. Excessive secretions and the underlying cause of respiratory failure were the only factors that

significantly contributed to the need for transfer to the ICU. In light of this, it may be more prudent to judge the need for ICU care based on the patient's ability to sustain unassisted spontaneous breathing. In my opinion, if a patient cannot tolerate cessation of NPPV for at least 1 hour, the patient should be transferred to the ICU.

Farha et al¹⁰ found the highest rate of NPPV failure (ie, need for transfer to ICU) in patients with pneumonia. Most of the available data on the use of NPPV in the wards have been from patients with COPD exacerbations.^{11,12,16,17} In addition to the presence of pneumonia, I would classify patients capable of being maintained outside the ICU by the type of acute respiratory failure. Those in whom the respiratory failure is primarily hypercapnic (eg, COPD, neurologic, neuromuscular disease) may be the best suited to be maintained on the ward. Patients with hypoxemic respiratory failure are at greatest risk and should be managed in the ICU. The literature clearly indicates that it is more difficult to manage hypoxemic patients with NPPV, and there is a greater probability of severe complications and poorer outcomes when invasive ventilation is delayed.¹⁸⁻²⁰

NPPV has clearly become the standard of care in the management of COPD and cardiogenic pulmonary edema, and has demonstrated utility in a number of other clinical settings.² Our understanding of NPPV application and problems has greatly matured over the last 10 years, and we have arrived at a point where the distribution of patients who can use NPPV should extend outside the ICU. Many patients require only periodic or nocturnal NPPV, and this application, when properly planned and monitored, can be provided safely outside the ICU for many of our patients.

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