

We begin 2009 by publishing the proceedings of the Journal Conference, *Noninvasive Ventilation in Acute Care: Controversies and Emerging Concepts*. Over the past 15 years, there has been evolving academic and clinical interest in the use of NIV. In 1997, the proceedings of a Consensus Conference on NIV were published in *RESPIRATORY CARE*. Much additional information on the use of NIV has become available in the ensuing 10 years, making this Journal Conference timely. Given that NIV improves important patient outcomes in appropriately selected patients, this is a topic that should prove compelling to many of our readers.

As Pierson points out in his paper, NIV has been used for many years, but current interest evolved primarily over the past 20 years. Also, in its current application, noninvasive positive pressure ventilation is used rather than the noninvasive negative pressure ventilation commonly applied during the polio epidemic of the 1950s. As Pierson points out, there is robust evidence supporting the efficacy of NIV in exacerbations of chronic obstructive pulmonary disease (COPD), cardiogenic pulmonary edema (CPE), and acute respiratory failure in immunocompromised patients. In these patients, NIV decreases the need for endotracheal intubation and affords a survival benefit. Many authorities consider the use of NIV in these patients to be a standard of care.

Despite the strong evidence supporting the use of NIV, its widespread clinical use has lagged in everyday practice. As Davies and Gentile point out, successful development of an NIV program depends on many variables. Institutional buy-in, use of proper equipment, staff training, and use of protocols and guidelines can be important elements when an NIV program is implemented. Initiation of an NIV program must incorporate education so that all involved appreciate the evidence base for this therapy. Typically, there is growth of the program as clinicians gain experience with NIV and recognize the improvement in patient outcomes with its use. As Davies and Gentile appropriately point out, a multidisciplinary approach is important for success.

A matter of much debate is the optimal location for NIV in acute care hospitals. Although it is often argued that patients started on NIV in acute-care hospitals should go to an intensive care unit, this is often impractical due to limited resources. As pointed out by Hill, choosing the appropriate environment for NIV requires consideration of the patient's need for monitoring, the monitoring capabilities of the unit, technical resources, nursing and respiratory therapy personnel resources, and the staff's skill and experience. When administrative and clinical decisions are made regarding the appropriate location for patients receiving NIV, it is important to consider the capabilities of the units in the facility and match the patient's need for monitoring to the unit's capabilities.

The interface is the primary distinction between invasive ventilation and NIV. The interface has been referred to as the weak link in the application of NIV. The paper by Nava et al is thus very important in considering the clinical use of NIV. Patient comfort often determines the success of NIV, and the interface often determines the extent of patient comfort. Facial skin breakdown and air leaks are complications of NIV specifically related to the interface. A variety of in-

terfaces are commercially available and include the oronasal mask, nasal mask, nasal pillows, helmet, and mouthpiece. Mouth leak is often a problem during acute respiratory failure and for this reason the oronasal mask is most commonly used. As Nava et al correctly indicate, there is no perfect interface, and interface choice requires careful evaluation of the patient's facial characteristics, ventilation mode, and type of acute respiratory failure. Nava et al also address the important issue of humidification during NIV. In the discussion following this paper, other important issues such as aerosol delivery during NIV are addressed.

In addition to the interface, the selection of an appropriate ventilator and ventilator mode are important to the success of NIV. Theoretically, any ventilator used for invasive mechanical ventilation could be used for NIV. In his paper, Chatburn classifies ventilators as noninvasive ventilators, standard homecare ventilators, and ventilators designed for use in the intensive care unit. In practice, the distinctions between these categories have become vague because some ventilators, such as current generation homecare and intensive care ventilators, have both invasive and noninvasive modes. For acute respiratory failure, leak compensation, oxygen delivery, and avoidance of rebreathing are important considerations. Battery power is also important for in-hospital transport. As Chatburn points out, selection of the ventilator mode should be based on comfort and safety. In North America, pressure support ventilation is most often used; proportional assist ventilation is an attractive alternative, but this mode is not available in the United States for NIV.

There is much literature describing the physiologic effects of NIV. Kallet and Diaz review the physiologic effects of NIV on work of breathing, breathing pattern, respiratory-system mechanics, and hemodynamic function. NIV reduces the work of breathing in proportion to the level of pressure support. In patients with COPD, positive end-expiratory pressure (PEEP) is also of benefit to counterbalance intrinsic PEEP. Interestingly, Kallet and Diaz found that a pressure support level of 15 cm H<sub>2</sub>O and a PEEP of 5 cm H<sub>2</sub>O reduced most measures of work of breathing and inspiratory effort toward normal. Note that when a bi-level noninvasive ventilator is used, these levels of pressure correspond to an inspiratory positive airway pressure of 20 cm H<sub>2</sub>O and an expiratory positive airway pressure of 5 cm H<sub>2</sub>O. Patients may not tolerate this level of inspiratory support, and lower levels may be necessary. Often, the level of inspiratory pressure is a compromise between patient tolerance and optimal physiologic benefit.

As pointed out by Keenan and Mehta, most of the randomized controlled trials (RCTs) have studied NIV for exacerbation of COPD or CPE. The RCTs strongly support the use of NIV for an exacerbation of COPD. NIV should also be considered for immunocompromised patients who develop acute respiratory failure. However, there are not enough data to recommend the use of NIV for patients with acute lung injury or acute respiratory distress syndrome, community acquired pneumonia, asthma, or chest trauma.

The topic of NIV for acute respiratory failure has high relevance to the readers of the Journal. The papers in the January and February, 2009, issues of *RESPIRATORY CARE* are an essential reference to the evidence and practical application of NIV.