

This month we are pleased to publish the second set of papers from the 44th Journal Conference, Respiratory Care Controversies II. These papers should prove useful as you explore these clinical questions in your own practice.

There is no debate that inhaled vasodilators, such as nitric oxide (NO) and prostacyclins, can improve hypoxemia, lower pulmonary arterial pressure, and improve right-ventricular function in patients with the acute respiratory distress syndrome (ARDS). Moreover, these effects are largely in the lungs, without systemic hemodynamic effects. Hence these drugs are called selective pulmonary vasodilators. But, are inhaled vasodilators useful in ARDS? As pointed out by Siobal and Hess, randomized controlled trials of NO in the treatment of ARDS have shown short-term improvements in arterial oxygenation, but no benefit in long-term outcomes. It has been shown that inhaled prostacyclins are as physiologically effective as NO, and they cost less, but no outcome studies have been reported on the use of prostacyclins in patients with ARDS. The authors conclude that there is no role for the routine use of inhaled vasodilators in patients with ARDS, but their use as a rescue therapy for severe refractory hypoxemia may be reasonable.

There should be no debate that low-tidal-volume ventilation strategies are beneficial in patients with ARDS. What is more controversial is the optimal level of positive end-expiratory pressure (PEEP) in this patient population. There has recently been interest in the role of the chest wall in patients with ARDS. Specifically, a high pleural pressure secondary to the effects of a stiff chest wall can result in atelectasis, hypoxemia, and exacerbation of lung injury. The traditional method used to estimate pleural pressure, and thus transpulmonary pressure, is to measure esophageal pressure. The question is whether esophageal pressure measurements are important in clinical decision-making in mechanically ventilated patients. Talmor and Fessler suggest that the currently recommended strategy of setting PEEP without regard to transpulmonary pressure may benefit some patients while harming others. The use of esophageal pressure measurements to identify the optimal ventilator settings, thus avoiding both under-inflation and over-inflation, has been proposed. Although this approach shows promise, larger clinical trials to assess its impact on clinical outcomes are needed.

The seminal ARDS Network (ARDSNet) study, published nearly 10 years ago, demonstrated that volume and pressure limitation during mechanical ventilation of patients with acute lung injury or ARDS saves lives. The ARDSNet study used volume-controlled ventilation and monitored plateau pressure. However, an issue of much debate is whether pressure-controlled ventilation can be used equally well as a lung-protective ventilatory strategy. In other words, are there benefits or harm from pressure targeting during lung-protective ventilation? As MacIntyre and Sessler point out, both volume-controlled ventilation and pressure-controlled ventilation can effectively provide lung-protective ventilation, but they prioritize different ventilation param-

eters. Thus, their responses to changing respiratory-system mechanics and patient effort are different. These different responses have advantages and disadvantages that can be important in specific circumstances. As the authors correctly point out, skilled clinicians can maximize benefits and minimize problems with either volume-control or pressure-control. It is operator expertise rather than the device design features that most impacts patient outcomes.

Ventilator-associated pneumonia (VAP) is receiving much attention because it increases costs, morbidity, and mortality. Gentile and Siobal address the question of whether or not specialized endotracheal tubes and heat-and-moisture exchangers are cost-effective in preventing ventilator associated pneumonia. The available evidence supports lower VAP rates with the use of silver-coated and antiseptic-impregnated endotracheal tubes, of endotracheal tubes with thin-walled polyurethane cuffs, and of endotracheal tubes that allow subglottic suctioning. Compared to active humidification, heat-and-moisture exchangers do not decrease the VAP rate. As the authors correctly conclude, controversy still exists regarding the evidence, cost-effectiveness, and risks of these devices.

There is much evidence supporting the use of noninvasive ventilation (NIV) in appropriately selected patients. But, should a patient be extubated and placed on noninvasive ventilation after failing a spontaneous breathing trial? As Epstein and Durbin point out, between 15% and 35% of mechanically ventilated patients fail an initial spontaneous breathing trial. Randomized controlled trials have indicated that, in selected patients with chronic obstructive pulmonary disease and acute-on-chronic respiratory failure, NIV can facilitate weaning, reduce the duration of invasive mechanical ventilation, decrease complications, and reduce mortality, compared to weaning on continued invasive ventilation. However, one must keep in mind the fact that extubation failure resulting in re-intubation is associated with higher mortality. Furthermore, this mortality risk increases with delay of re-intubation and may *not* be prevented by application of NIV. The authors correctly recommend that patients extubated to NIV be carefully monitored to provide timely re-intubation if the patient shows signs of intolerance or worsening respiratory failure.

Another issue related to NIV is humidification. Specifically, is humidification always necessary during NIV in the hospital? As debated by Branson and Gentile, the need for humidification during NIV is controversial. Patient comfort is a critical issue during the application of NIV, and humidification may improve patient comfort. On the other hand, the humidifying function of the upper airway is intact during NIV. This paper provides the arguments for and against routine humidification during NIV in the hospital setting.

Branson provides the conference summary. As he points out, the clinical controversies addressed in this conference are often settled by expert opinion and personal bias. Further research is needed to address many of the still unanswered important clinical questions in the field of respiratory care.