

This month's issue contains the proceedings of the Journal Conference, sponsored by the American Respiratory Care Foundation, on noninvasive respiratory support in adults. Noninvasive ventilation (NIV) has been a sentinel change in the practice of mechanical ventilation over the last 20 years. The introduction of high-flow nasal cannula (HFNC) has further expanded the noninvasive techniques available to avoid endotracheal intubation. This special issue covers the physiology and technology behind these techniques.

MacIntyre describes the physiologic effects of NIV, specifically as it differs from invasive ventilation. This includes the use of CPAP and NIV. The impact on work of breathing, functional residual capacity, intrinsic PEEP, airway function, and hemodynamics are reviewed in detail.

A discussion of ventilator-induced lung injury by Bhushan focuses on the well described as well as the emerging etiology of lung injury. This paper reviews the contribution of NIV and HFNC to prevention of ventilator-induced lung injury (VILI) with comparisons to invasive ventilation. The role of vascular pressures in the genesis of VILI is a recent finding which is also discussed.

Noninvasive respiratory support in hypoxemic respiratory failure is discussed by Piraino. Considerable controversy surrounds the treatment of *de novo* respiratory failure. In ARDS the role of NIV is limited. On the other hand, the success of CPAP for pulmonary edema is steeped in evidence. This review describes important considerations when hypoxemic respiratory failure is managed with noninvasive respiratory support. Importantly, the use of NIV in severe hypoxemia is associated with greater mortality compared to invasive ventilation.

Hill et al describe the use of noninvasive respiratory support in the treatment of hypercapnic respiratory failure. NIV remains the standard of care for COPD exacerbation, with an advantage over HFNC when an increase in alveolar ventilation is required. HFNC may be useful in mild hypercapnia with an advantage with respect to comfort.

The controversial use of noninvasive respiratory support postextubation is described by

Kacmarek. This paper contrasts the roles of CPAP, NIV, and HFNC to smooth the transition to spontaneous breathing and as a rescue treatment to avoid re-intubation. In all cases, failure to recognize the need for re-intubation carries important consequences.

Benditt reviews the use of noninvasive respiratory support in subjects with neuromuscular disease. Nocturnal NIV and the use of cough support (manual methods and mechanical insufflation-exsufflation) are standards of care in amyotrophic lateral sclerosis. The importance of swallowing evaluation and treatment in bulbar disease is also reviewed.

Strickland describes the patient experience during noninvasive respiratory support, including the effects of patient-ventilator synchrony and comfort on successful application. The importance of mask fit, choice of interface, and management of leak are all factors the clinical team must address.

Davies details the role of noninvasive respiratory support at the end of life. This review includes the do-not-intubate and do-not-resuscitate paradigm on the use of noninvasive respiratory support to improve comfort in patients with terminal disease.

NIV can be provided by both ICU and so called 'bi-level' devices. Scott discusses the role of each device, including advantages and disadvantages of the various equipment. The role of devices in enhancing patient-ventilator synchrony is also reviewed.

CPAP has been used in adults for nearly three-quarters of a century and the use of nasal CPAP in infants revolutionized neonatal intensive care in the 1970s. Volsko describes the plethora of devices, ranging from simple to complex, used to deliver CPAP in both infants and adults.

Nishimura describes the equipment required to deliver HFNC. This review includes the importance of heat and humidification for patient comfort and the impact of flow on lung volumes and carbon dioxide elimination. This paper also discusses issues related to noise levels associated with HFNC devices and infection control concerns.