

Although leak compensation is available on acute care ventilators to improve patient-ventilator synchronization in the presence of leaks, there are few data on these ventilators' ability to prevent triggering and cycling asynchrony. This is most important during noninvasive ventilation (NIV). The Editor's Choice paper this month is a lung model study by Oto et al that addresses this issue. They found that leak compensation in invasive and noninvasive modes varies widely between ventilators, but it is unclear whether these differences have clinical importance. Vignaux and Piquilloud point out that the very large leaks used in this study call into question the clinical applicability of the results and suggest that additional bench tests using less challenging conditions should be conducted.

Many pediatric patients need positive airway pressure (PAP) for treatment of obstructive sleep-disordered breathing. Adherence to PAP is often poor and not sustained long-term. Jambhekar and colleagues assessed the role of a respiratory therapist in improving adherence to PAP treatment in a pediatric sleep apnea clinic. They found that utilization of clinic visits from a respiratory therapist trained in the use of PAP improved adherence in pediatric subjects with obstructive sleep-disordered breathing, particularly when their baseline PAP adherence was < 50%.

NIV failure is common in patients with COPD admitted to the ICU for acute hypercapnic respiratory failure. Contou et al assessed the rate of NIV failure and identified early predictors of intubation in a unit experienced with use of NIV. They found that the intubation rate could be reduced to 15% in patients receiving NIV, with a mortality of only 5%. Whereas the risk of NIV failure was associated with hypoxemia and acidosis after initiation of NIV, it was also influenced by the presence or absence of underlying chronic respiratory disease.

Until now, no study has considered outcomes related to location prior to admission to a respiratory ICU. Valentini et al found that step-up patients, transferred because of clinical deterioration, from a medical or respiratory ward are more severely ill and more likely to die. Age, female sex, and nutritional status were also major determinants of survival. Interestingly, they found that use of NIV in the respiratory ICU was often not curative but only palliative.

The hospital-at-home model may provide adequate care without an adverse effect on clinical outcome, and is generally well received by users. The objective of the study by Vianello et al was to compare hospital-at-home and in-patient hospital care for patients with neuromuscular disease who have respiratory tract infections. They found that hospital-at-home is an effective alternative to hospital admission for selected patients with neuromuscular disease and respiratory tract infections.

The ability of respiratory therapists to find equipment quickly is desirable to expedite patient care. To optimize location of ventilators, Stoller et al developed and implemented a radio-frequency identification (RFID) tagging system called eTrak. The RFID tracking system shortened the time to locate ventilators and improved respiratory therapist satisfaction with finding equipment.

Berlinski evaluated nebulized albuterol delivery in a model of spontaneously breathing children with tracheostomy. Albuterol delivery with tracheostomy was influenced by type of device and configuration, use of assisted breathing, breathing pattern, and tracheostomy tube size. Mass median aerodynamic diameter significantly decreased during passage through a tracheostomy tube.

In another aerosol therapy-related paper, Coates et al evaluated respiratory system deposition of inhaled magne-

sium sulfate with a novel aerosol delivery system in spontaneously breathing healthy adults. They used a vibrating mesh nebulizer coupled with a holding chamber and face mask. Their data confirm the deposition data predicted in an *in vitro* study, and the device appears suitable for a clinical trial of inhaled magnesium sulfate in patients with refractory asthma.

Kao and colleagues evaluated the impact and predictors of prolonged chest tube duration in mechanically ventilated patients with acquired pneumothorax. They found that high peak inspiratory pressure and surgical emphysema were independent predictors of prolonged chest tube duration and negatively impact clinical outcomes. These findings may better inform chest tube management.

The influence of purulence on ciliary and cough transport in bronchiectasis was evaluated by Tambascio and colleagues. They analyzed and compared the transport properties of respiratory secretions with mucoid versus purulent appearance in subjects with bronchiectasis and in those without lung disease. Respiratory secretions in individuals with bronchiectasis have poor transport properties, which were more accentuated in the purulent samples. This may assist in clinical care and to obtain more homogeneity between groups of subjects in research studies.

Chest wall mobility is often measured in clinical practice, but the correlations between chest wall mobility, respiratory muscle strength and lung volumes are unknown. In the study by Lanza et al, the authors found that chest wall mobility is related to respiratory muscle strength and lung volumes in healthy subjects.

The 4-meter gait speed (4MGS) has been associated with functional capacity and overall mortality in elderly patients. DePew et al evaluated the association of 4MGS with meaningful outcomes. They report that 4MGS was associated with 6-minute walk distance, and thus may serve as a reasonable simple surrogate for the 6-minute walk test in subjects with chronic lung disease.

Guan and colleagues investigated the use of impulse oscillometry for leukotriene D₄ inhalation challenge in asthma. They found that it has a diagnostic power similar to that of spirometry.

Although self-inflating bags are widely used for manual hyperinflation, they do not allow ventilation parameters, such as pressure or volume, to be set. Ventilation performance of neonatal and pediatric self-inflating bags was investigated by Oliveira et al. They found that performance of neonatal and pediatric bags varied by manufacturer and oxygen flow, and that the neonatal bags showed higher ventilation parameter variation than the pediatric bags.

Pulmonary microcirculation abnormalities are the main determinants of pulmonary arterial hypertension pathophysiology. Dimopoulos et al evaluated peripheral muscle microcirculation with near-infrared spectroscopy, before and after hyperoxic breathing. They found substantial impairments of peripheral muscle microcirculation in subjects with pulmonary arterial hypertension. Acute hyperoxic breathing improved resting tissue O₂ saturation and decreased reactive hyperemia time during reperfusion, possibly due to increased oxidative stress and evoked vasoconstriction.

Mesquita and colleagues investigated respiratory muscle strength and related factors in patients with COPD during and after hospitalization for COPD exacerbation. They found a high prevalence of inspiratory muscle dysfunction in patients hospitalized for COPD exacerbation. Interestingly, inspiratory and expiratory muscle strength increased markedly during and after hospitalization. The degree of airflow obstruction and hyperinflation were related to inspiratory and expiratory muscle strength.