Fan et al evaluated the frequency, timing, and risk factors for complications from recruitment maneuvers in adult patients with ARDS. Complications were common, but serious complications were infrequent. Continuing on the theme of recruitment maneuvers, Franchi and colleagues evaluated the efficacy of recruitment maneuvers before tracheostomy. Their results suggest that recruitment maneuvers performed before percutaneous dilational tracheostomy could be useful to avoid hypoxemia following the procedure. As Imanaka points out in his editorial, much remains to be learned about the role of recruitment maneuvers in the care of mechanically ventilated patients. Given their uncertain benefit in patients with ARDS, and the potential for complications with repeated application, the routine use of recruitment maneuvers is not justified. However, they may have a role in association with procedures that result in alveolar de-recruitment.

Volatile anesthetics are used in some centers for the treatment of severe bronchospasm. Turner et al retrospectively reviewed one center’s experience with the use of isoflurane in this setting. They concluded that isoflurane is an effective therapy in patients with life-threatening bronchospasm refractory to conventional therapy. This study is limited by its retrospective design and lack of a control group. As Walsh and Green write in their editorial, much is yet to be learned before this therapy is ready for prime time.

Although its use is controversial, high-frequency oscillatory ventilation (HFOV) has been utilized as a rescue oxygenation therapy in adults with ARDS. Bostick and colleagues examined whether retrograde CO2 entrainment occurs due to the active exhalation with HFOV. They found that retrograde CO2 entrainment occurs during HFOV and can be manipulated with the ventilator settings. Chatburn and El-Khatib, in their detailed editorial, provide an engineering model using electronic circuit analysis to describe the mechanism for this finding.

In recent years, there has been much clinical and academic interest in the use of heated and humidified high flow nasal cannula oxygen therapy. Lenglet et al studied the feasibility and efficacy of this therapy in the emergency department. They found that switching to high flow oxygen therapy by nasal cannula from non-rebreathing mask alleviated dyspnea and improved respiratory parameters in subjects with acute hypoxic respiratory failure. This observational study provides additional evidence for the benefit of high flow nasal cannula therapy.

Another area of controversy is the need for humidification during noninvasive ventilation (NIV). In consecutive subjects receiving NIV, Lellouche et al used a heat-and-moisture exchanger and heated humidifier in randomized order for 30 min each. They found that use of a heat-and-moisture exchanger decreased CO2 elimination during NIV, despite increased minute ventilation. This effect was most evident in hypercapnic subjects.

Optimal titration of inspired oxygen is important to prevent hypoxemia in critically ill mechanically ventilated patients. Despite increasing evidence of the deleterious effects of hyperoxia, there is a paucity of data about FIO2 practice and oxygen exposure among critically ill patients. Rachmale and colleagues assessed excessive FIO2 exposure in mechanically ventilated patients and evaluated its effect on pulmonary outcomes. They found that excessive oxygen supplementation is common in mechanically ventilated patients with ARDS and may be associated with worsening lung function.

Lin et al evaluated the influence of nebulizer type with different pediatric aerosol masks on drug deposition. In a model using ventilatory parameters associated with a spontaneously breathing 2 to 4-year-old child, breath-actuated nebulization was not as effective as continuous nebulization. In another model of aerosol delivery technique, Sood and colleagues evaluated aerosol delivery during neonatal high frequency jet ventilation. They used magnetic resonance imaging of an innovative and inexpensive lung phantom, and found that aerosol deposition with jet ventilation was intermediate between that observed with conventional ventilation and HFOV. As with all lung model studies, these study results must be clinically validated.

The results of studies of manual hyperinflation to improve airway clearance in adults have shown considerable variability, and this therapy remains controversial. Oliveira et al evaluated whether experience influences the performance of neonatal and pediatric manual hyperinflation. Overall, manual hyperinflation performance was similar between the experienced and inexperienced therapists; the only difference was the observation of the highest peak inspiratory flow in the experienced group. Also on the topic of airway clearance, Aquino and colleagues evaluated whether CPAP would increase the beneficial airway clearance effect of hypertonic saline in subjects with cystic fibrosis. They found that CPAP alone had no effect on airway clearance, sputum properties, or expectorated volume, and did not potentiate the effect of hypertonic saline alone in subjects with cystic fibrosis.

Andrade et al compared exercise tolerance time, cardiopulmonary stress, and perception of effort between the Chester step test and a modified incremental step test in subjects with COPD. They found that the slower the work rate increment during step test, the higher the exercise tolerance. Regardless of the work rate increment, cardiopulmonary stress and exertion effort at peak exercise were equivalent between tests.

Although fiberoptic bronchoscopy and lung biopsy are important diagnostic tools in patients with diffuse pulmonary infiltrates, patients undergoing this procedure often have hypoxemic respiratory failure. Agarwal et al found that NIV-assisted bronchoscopic lung biopsy is a novel method for obtaining diagnosis in hypoxemic lung lesions with diffuse lung infiltrates. However, this approach should be reserved for centers with extensive experience in NIV, and further studies are needed to define the utility of this approach.

The aim of the study by Krivec and colleagues was to assess whether there is a correlation between nocturnal hypoxemia and hypercapnia and sleep efficiency and sleep fragmentation in children. They found that, in children with nocturnal hypoxemia, nocturnal hypoxemia but not hypercapnia correlates with sleep efficiency and sleep fragmentation.

Bender et al determined whether arterial sampler filling time can be an accurate indicator of obtaining an arterial blood sample in subjects with various blood pressures. They found a negative correlation between mean arterial pressure and sampler filling time, and suggest that respiratory therapists may find arterial sampler filling time a useful indicator of successful arterial puncture at the bedside.

Tuberculosis (TB) remains an important public health problem worldwide, as its residual lesions result in functional and quality of life impairments. Godoy et al found that cured subjects with multiple-drug-resistant pulmonary TB exhibit impaired respiratory function and a mildly reduced functional capacity and quality of life.