

The Editor's Choice for October evaluates two methods of lung expansion therapy in subjects following upper abdominal surgery. Rowley and colleagues randomized subjects to receive incentive spirometry or positive airway pressure therapy 3 times/d for 5 d following surgery. The main outcomes were postoperative pulmonary complications (PPC) and changes in end expiratory lung impedance (EELI). There were no differences in PPCs or hospital length of stay. Importantly, there were no differences in EELI change with either therapy. A criticism of this work is the lack of a control group, randomized to up and out of bed. Piraino highlights the inconvenient truth that most therapies aimed at improving lung aeration following surgery provide short-lived changes that fail to result in meaningful clinical outcomes. Future trials should have a control group where therapy is simply early mobility to include moving from the bed to a chair, followed by ambulation.

Smallwood et al describe the impact of PEEP changes on oxygenation in pediatric subjects requiring mechanical ventilation. They defined subjects as responders if the S_{pO_2}/F_{IO_2} increased and as non-responders if S_{pO_2}/F_{IO_2} decreased. PEEP changes in either direction only had the desired effect in a little over half of cases. They conclude that PEEP titration often fails to produce the desired results and that PEEP response may require individual assessment. This trial extracts data from the medical record and is limited by not knowing the reasoning behind each PEEP change. Straube and colleagues suggest that stratification of subjects based on severity of hypoxemia may have improved the anticipated oxygenation response to PEEP.

Bello and others evaluated the impact of thyroid hormone treatment on diaphragmatic efficiency in mechanically ventilated subjects. All subjects had non-thyroidal illnesses and had failed a spontaneous breathing trial. Following treatment with triiodothyronine, diaphragmatic function was measured. They concluded that thyroid hormone replacement treatment did not benefit respiratory muscle function and that restoring normal levels of serum thyroid hormones is debatable. Schmidt provides expert commentary on the strengths and weaknesses of this trial, agreeing that in the absence of a measurable physiologic change, further trials of thyroid replacement in ventilated subjects are not warranted.

Fujimoto et al compared end-tidal CO_2 measurements in non-intubated subjects to arterial, venous, and transcutaneous measures of CO_2 . They studied 18 subjects with hypoxemic and hypercarbic respiratory failure and found that, at best, transcutaneous CO_2 could estimate arterial CO_2 . However the limits of agreement were wide, making end-tidal CO_2 more appropriate as a trend monitor.

Schreiber and colleagues evaluated the impact of heated humidifiers and heat and moisture exchangers (HME) on gas exchange and indices of respiratory work in mechanically ventilated subjects with a tracheostomy. HMEs were associated with higher pressure time product, higher P_aCO_2 , and lower pH, as well as worsening dyspnea scores. These findings confirm previous work that the additional deadspace created by the HME has negative consequences in select patients.

Said and others compared drug delivery from two different beclomethasone inhaler/spacer combinations. In a group of healthy volunteers, they measured urinary beclomethasone and drug retained in the spacer. They found that the use of

a spacers with a beclomethasone inhaler reduced impaction and drug deposition in the upper airway. An improved lung deposition was achieved with non-rinsed spacers compared to spacers rinsed with water.

High-flow nasal cannula (HFNC) use has increased dramatically in the last decade. Garofalo et al tested the combined HFNC and helmet CPAP system in healthy volunteers. They found that the system was well tolerated and measures of pharyngeal airway pressure were similar. The clinical utility of this technique remains to be determined.

Ejiofor et al evaluated the PEEP effect of HFNC in a pediatric model. Using airway models created from a 3D printer and a lung model, they compared flows from 6 to 60 L/min. They noted that increasing flow increased PEEP while leak and larger naris size (related to model age) resulted in a decrease in PEEP. These findings support previous work.

Patients often fail to use inhalers in an optimal fashion despite educational efforts. Dąbrowska et al evaluated the effect of a single session of inhaler technique training on inhalation errors. Follow up was completed and 3 and 6 months. They found that a single inhalation training reduced the number of errors made, but did not influence the course of asthma or COPD. The effect of a single inhalation technique training was short-lived.

The sit-to-stand (STS) test evaluates the strength of the lower limbs and is impaired in individuals with muscle wasting. In a group of subjects with COPD, Zanini et al evaluated the 30-s STS and correlated the findings to traditional measures before and after pulmonary rehabilitation. They reported that in stable subjects with moderate-to-severe COPD, 30-s STS was a sensitive tool for assessing the success of pulmonary rehabilitation.

Toni and colleagues compared the management of pediatric subjects with bronchiolitis in two 1-y time frames 5 years apart. This retrospective single-center trial found that HFNC use before ICU admission was more frequent in the later time period. There was also an increase in the use and success of NIV with a total face mask. HFNC did not independently prevent invasive ventilation.

Domaradzki et al describe the use of the S_{pO_2}/F_{IO_2} ratio as a predictor for early hemodynamic deterioration in subjects with acute pulmonary embolism. In this retrospective chart review, they found that an initial S_{pO_2}/F_{IO_2} predicted hemodynamic deterioration with a sensitivity of 74% and specificity of 88%. Monitoring S_{pO_2}/F_{IO_2} in this population may allow for early intervention or prevention.

Determination of the appropriate time for ventilator liberation remains an important goal in the ICU. Guimarães et al evaluated the weekly measurement of the timed inspiratory effort (TIE) index to predict successful ventilator liberation following prolonged mechanical ventilation. In this prospective observational trial a TIE index ≥ 1.0 cm H_2O/s was associated with liberation success.

O'Driscoll and Smith provide an invited review of oxygen use in critical illness. The authors are architects of the British Thoracic Society guidelines on oxygen therapy and bring to the forefront the need for targeted oxygen delivery and avoidance of hyperoxia.

Scott and others provide a narrative review of ventilator alarms and alarm fatigue. This area is poorly understood and rarely studied. The authors propose some priorities for future research.