

This Month's Editor's Choice is a comparison of high-flow nasal cannula (HFNC), constant flow oxygen and automated oxygen titration in subjects with chronic respiratory disease during exercise. Vézina and colleagues used each method in a randomized fashion in 10 subjects, with the main outcome the end exercise Borg score. Secondary outcomes included endurance time, dyspnea and oxygenation status during exercise. They found that automated O<sub>2</sub> titration was superior to fixed flow O<sub>2</sub> in alleviating dyspnea and improving exercise endurance in subjects with chronic respiratory diseases. HFNC added to automated O<sub>2</sub> titration had no impact. Hill et al provide commentary noting that while dyspnea was not reduced by automated O<sub>2</sub> titration, duration of the endurance shuttle walk test increased by >50%. They suggest future research should focus on the mechanisms which confer a benefit and improved portability of the device.

Harbrecht and others performed a retrospective review of unplanned extubations (UEs) in trauma subjects. Prospective tracking of UEs was accomplished as part of a quality initiative. They found that subjects with a UE were more frequently male, younger, and had longer hospital and ICU lengths of stay. Factors contributing to UEs included patient, mechanical, and provider etiologies. They reported that UEs were decreased with education and tracking of events and that self-extubation was associated with fewer negative outcomes. Baker and Lentz discuss the importance of preventing of UEs and provide an overview of methods for reporting outcomes of quality initiatives in an accompanying editorial. They agree with Harbrecht et al that real-time up-to-date reporting employing a combination of statistical process control charts, timely review, and feedback can reduce UE rates.

Garnero and Chatburn describe a bench study of the automatic apnea time adjustments using AutoMode at a variety of set respiratory rates. They observed apnea times between 3 and 12 s depending on the mandatory breath rate and spontaneous breath count. These values were within 2% of expected values. They also found that AutoMode allowed a spontaneous breath rate lower than expected. LeTourneau and Oeckler provide an accompanying editorial noting that the increased sophistication of ventilators and use of closed loop control increases the importance of understanding the operation of ventilators used at the bedside. This also highlights the importance of the respiratory therapist at the bedside.

Ntounenopoulos and colleagues studied the impact of high frequency chest wall oscillation (HFCWO) on mechanical ventilation in a model. Invasive ventilation was delivered to a manikin. HFCWO resulted in false triggering of the ventilator and up to a 7-fold increase in respiratory rate. These changes also resulted in a flow bias that was associated with caudal movement of airway secretions. As HFCWO has no evidence base for use in invasively ventilated patients, these untoward effects suggest that this technique only be used in a research setting.

Wang and others compared inspiratory muscle training to usual care in subjects undergoing thorascopic lobectomy for lung cancer. Subjects receiving progressive inspiratory muscle training had increased lung volumes at one month post-operatively, shorter hospital length of stay, and quicker removal of chest drains. However, there were no differences in postoperative atelectasis and pneumonia.

Halaseh et al performed a retrospective study of subjects with COVID-19 and ARDS to determine reintubation rates and the

factors associated with reintubation. In a single-center study of 114 subjects, the reintubation rate was 32%. They found that higher doses of midazolam, fentanyl, and higher APACHE-II scores were independently associated with reintubation while advanced age, male sex, and subjects with delirium were independently associated with mortality.

Berlinski and Willis performed a bench study of aerosolized drug delivery during intrapulmonary percussive ventilation (IPV) combined with invasive ventilation. They varied test lung compliance, breath type, endotracheal tube size, and IPV settings. Albuterol delivery was measured by collecting gas at the tip of the endotracheal tube and quantified by spectrophotometry. The main contributors to albuterol delivery were the duration of adapter opening and IPV settings. They concluded that delivery of aerosolized medications is inefficient and should not be relied upon when using IPV.

Georges et al performed a prospective study in subjects with stable obesity hypoventilation syndrome (OHS) treated with nocturnal noninvasive ventilation (NIV). They measured diurnal oximetry, capnography, arterial blood gases, and transcutaneous P<sub>CO<sub>2</sub></sub> (P<sub>tcCO<sub>2</sub></sub>) in 32 subjects to evaluate residual hypoventilation. In 19 subjects with normal blood gases and oximetry, 11 demonstrated elevated P<sub>tcCO<sub>2</sub></sub>. They suggest that continuous P<sub>tcCO<sub>2</sub></sub> monitoring improved detection of residual hypoventilation compared to oximetry and blood gases.

Luo and others performed a retrospective study of outcomes comparing early and late tracheostomy. Early tracheostomy was defined as before day 7 and late tracheostomy as after day 7. They included 175 subjects requiring tracheostomy over a 7-year period. One-to-one propensity score matching was used to correct the baseline characteristics between the early and late tracheostomy groups. The primary outcome was the incidence of ventilator-associated pneumonia (VAP) between groups. Compared with late tracheostomy, the incidence of VAP and hospital length of stay were reduced while sedation-free days, ventilator-free days, and ICU-free days were increased in the early tracheostomy group.

Miller and colleagues performed a retrospective study of non-invasive respiratory support in 51 pediatric ICU subjects weighing < 10 kg. They *a priori* defined support as planned or rescue therapy. NIV was used in 61% and CPAP in 39% of subjects. Planned post-extubation support was provided in half of subjects. Reintubation rates were higher in the rescue group, those with acidemia, higher F<sub>IO<sub>2</sub></sub> requirement, elevated ventilation settings, and lower somatic near-infrared spectroscopy.

Lambrinos and others studied the impact of an online education course regarding mechanical insufflation-exsufflation (MI-E) on caregiver confidence and competence. The educational material reviewed theoretical and practical components and was designed to take 6 hours to complete. Physiotherapists were randomized to either the intervention group who had access to the education or the control group who received no education. They administered baseline and post-intervention questionnaires using visual analogue scales (VAS), with the primary outcomes being confidence in the prescription and confidence in the application of MI-E. The intervention group had a significant improvement in the VAS after the education period. They concluded that access to an evidence-based online

education course improved confidence in the prescription and application of MI-E.

Molano-Franco and others performed a prospective cohort study of subjects with COVID-19 and ARDS receiving HFNC in hospitals at altitude (8,500 feet). HFNC settings and gas exchange were evaluated across the course of treatment. They determined that a ROX index of  $> 4.88$  predicted HFNC failure at altitude. Elevated  $F_{IO_2}$  at admission ( $> 0.8$ ) was also associated with need for intubation. They recommend modification of the ROX index for high altitude environments.

Lopes de Novaes and colleagues provide a short report on the use of electrical impedance tomography to compare PEEP titration

methods in subjects with COVID-19 and ARDS. Lellouche et al provide a short report on the impact of oximeter brand on  $S_{pO_2}$  targets and oxygen flow requirements. The individual brands of oximeters have biases that are equivalent in size to those caused by skin pigment and can significantly increase oxygen delivery needed to maintain the same  $S_{pO_2}$  target.

Freitas dos Santos et al provide a systematic review on self-management interventions in subjects with interstitial lung disease. We also continue our symposium *Research and Publication in Respiratory Care* with articles by Kaur and Li on how to conduct a randomized controlled trial and by Miller on moving from abstract to manuscript.