

This month's Editor's Choice paper describes the use of high-flow nasal cannula (HFNC) outside the ICU. Jackson and colleagues report implementation of HFNC on the wards as a method to reduce costs and assure safety. Of 346 subjects, 238 avoided ICU admission. Few progressed to noninvasive ventilation (NIV) or invasive ventilation (6% and 5%). They concluded that extensive education and careful subject selection were critical to successful use of HFNC for hypoxemia. Berlin provides commentary highlighting the importance of innovation by respiratory therapists (RTs) to improve patient outcomes.

Jonkman and colleagues evaluated a pneumatic automatic resuscitator in a bench study and porcine model of hypoxemia. They report stable and predictable function on the bench and capability of supporting gas exchange in the model comparable to a conventional ventilator. Changes in compliance were predicted by changes in respiratory frequency; the authors suggest this could be used to alert caregivers of patient status. They also rightly note that the device requires an attendant. Branson and Rodriguez's accompanying editorial reviews automatic resuscitators, performance, and the importance of ventilators in the current pandemic. Minimum performance, monitoring, and alarms are required to be a solution. Quality trumps quantity, size, and economy.

Sancho and others describe a 2-year prospective crossover study of mechanical insufflation-exsufflation (MI-E) with and without oscillations in amyotrophic lateral sclerosis (ALS) subjects. In a small study of 19 subjects there were no differences in episodes of respiratory infections, hospital admission, or need for bronchoscopy. They concluded that oscillations during MI-E in ALS did not provide any benefit. Swingwood, Shah, and Rose provide commentary suggesting the study is well done, but limited by the sample size and might miss an actual effect. They detail the importance of non-MI-E-based secretion management including hydration, mucolytics, aerosol therapy, and mouth care which should be accounted for in future trials.

Modi and others performed an evaluation of the pulse oximetry function of smartphones. They measured  $S_{pO_2}$  with an oximeter and 2 smartphones. Forty-seven subjects requiring a pulmonary function study were recruited.  $S_{pO_2}$  mean differences were similar. However, both smartphone devices were unable to detect an  $S_{pO_2}$  signal in a third of subjects. They concluded that smartphone oximeters were comparatively unreliable.

Iliia et al evaluated the responses to PEEP on end-expiratory lung volume (EELV) and compliance as related to stress and strain in pediatric subjects with and at risk for ARDS. They evaluated 896 measurements in 32 subjects exposed to an incremental PEEP trial over 72 h. Compliance and EELV were lower and stress and strain were higher in ARDS versus non-ARDS.

Rauf and others performed a retrospective cohort study in children with ARDS to determine the impact of driving pressure on morbidity and mortality. They reviewed records of 380 subjects, 101 of which were eligible for analysis. Using logistic regression they determined that driving pressure  $< 15$  cm  $H_2O$  was associated with a decrease in morbidity but not mortality.

Steindor and coworkers retrospectively reviewed home NIV use in pediatric neuromuscular disease (NMD) subjects. In a group of 128 NMD subjects  $< 17$  y of age, quartiles of age were used to compare ventilator settings and vital capacity. A set back-up rate was more commonly used in younger subjects, but airway pressures were similar across ages. They suggested that these data might serve as a guide for initial NIV settings followed by titration.

Harper et al evaluated a closed loop control system for HFNC in a group of adults with chronic respiratory disease. They compared  $S_{pO_2}$  time at target and desaturations during 6-min walk test and during recovery. Closed-loop control maintained  $S_{pO_2}$  in the target range for 54.4% of the 6MWT and 76.3% of the recovery period. The proportion of time spent in target range during rest was significantly greater compared to 28% oxygen. They concluded that the closed loop system was able to respond to exercise-induced hypoxemia.

Gonzalez Bellido et al evaluated the safety of high frequency chest wall oscillation in hospitalized infants with bronchiolitis. Subjects were

randomized to airway clearance consisting of prolonged exhalation and stimulated cough or chest wall oscillation. They compared  $S_{pO_2}$ , sputum weight, and number of adverse events. In 92 subjects there were no differences in  $S_{pO_2}$  or adverse events between groups.

Pannu and others evaluated the use of an electronic medical record system to notify RTs of excess  $O_2$  exposure in ventilated subjects. They compared RT-driven  $F_{IO_2}$  titration to physician orders. In 195 subjects, alert accuracy was 78% and RTs responded to 64% of alerts. Exposure to hyperoxemia was significantly reduced.

Aktan et al compared pulmonary function testing, the severity of dyspnea, severity of fatigue, physical activity level, and health-related quality of life (HRQOL) based on the severity of small airways dysfunction in men with moderate COPD. They defined 2 groups based on maximal mid-expiratory flow (MMEF) below and above average MMEF%. They concluded that increased small airways dysfunction led to greater dyspnea and fatigue, and poor exercise capacity and HRQOL.

Urbankowski and Przybyłowski evaluated subjects undergoing methacholine challenge (MC) measuring airways resistance using body plethysmography, forced oscillation technique, and interrupter technique as well as  $FEV_1$ . Subjects with asthma-like symptoms were recruited. There were differences in airways resistance measures between measurement techniques. They concluded that changes in airway resistance during MC were detectable by  $FEV_1$  in non-responders with methacholine-induced asthma-like symptoms.

Althunayyan et al compared different methods of hand position on the mask and ventilation during ventilation in a model simulation. They recruited 75 RTs who used 2 methods of holding the mask. One used the hand to create a C-shaped grip of the mask and the other placed both hands in the same position on opposite sides of the mask. There was a minor effect of hand position on successful volume delivery (74% vs 68%) while participants preferred the C-shaped grip for comfort.

Spoletini and colleagues performed a retrospective analysis of NIV use in cystic fibrosis (CF) subjects in the United Kingdom over a 10-year span. NIV was initiated on 64 occasions, most commonly for hypercapnia. Subjects who discontinued NIV early had a progressive decline in  $FEV_1$  while those continuing with NIV showed a slower decline. No differences in intravenous antibiotic requirement or exacerbations were noted. They concluded that NIV stabilized lung function but did not alter rehospitalization or infection rates.

Hudmon and coworkers evaluated an interprofessional tobacco cessation train-the-trainer program for respiratory therapy faculty. They conducted five, 2.5 hour web-based train-the-trainer programs and surveyed participants at baseline, post-training, and at the end of the academic year. They included 270 faculty who nearly all reported improvements in their ability to teach smoking cessation. They concluded that the program had a positive impact on faculty's perceived confidence and ability to teach smoking cessation.

Demchuk and Chatburn evaluated 16 different positive expiratory pressures (PEP) and oscillatory PEP (OPEP) devices in a bench study using simulated expiratory flows from 5-30 L/min. Pressure and flow waveforms were generated and flow amplitude, flow frequency, oscillation index, and resistance were determined. They concluded that PEP devices behaved similarly while OPEP devices demonstrated potentially clinically important differences in oscillatory index.

Zavorsky et al evaluated the stability of whole blood lactate measurements from samples stored at room temperature or in ice. Arterial and venous samples from 202 subjects had blood lactate concentration measured over 5 time-points. Samples were stored at room temperature (22-24°C) or under slushed ice conditions (0.1-0.2°C) before analysis. The difference in lactate measures suggested iced conditions are unnecessary.

Huang and others contribute a narrative review of music therapy in adults with COPD. They reported a reduction in dyspnea and anxiety in COPD subjects participating in music therapy. Kallet and colleagues provide a narrative review of lung recruitment and derecruitment in ARDS and propose when and how to perform recruitment maneuvers, and in which populations.