Editor's Commentary

January's Editor's Choice paper describes a COPD bundle in the emergency department (ED) to prevent repeat ED visits. Zafar and colleagues implemented a care bundle including 5 components: appropriate inhaler regimen, 30-d inhaler supply, education on devices post-discharge, standardized discharge instructions, and a scheduled 15-d appointment. After 6 months, adherence to the bundle was 90% and the 30-d ED revisit rate fell from 49% to 30% while the hospitalization rate from the ED was unchanged. MacIntyre pens the accompanying editorial noting that the key components of this bundle (medication management and scheduled follow-up) are multidisciplinary and patient-focused. While there are limitations in the study design, this work reinforces that COPD care must be integrated across the spectrum from chronic home management to acute care.

Tusman and colleagues compare the measurement of deadspace in an animal model of ARDS using Bohr's and Enghoff's methods during graded PEEP steps. Gas exchange and respiratory mechanics were recorded. The authors noted that deadspace to tidal volume ratios (V_D/V_T) were impacted by the level of PEEP, with high PEEP associated with an increase in measures using the Bohr equation, and the Enghoff equation showing higher values at low PEEP. They conclude that Bohr's deadspace was associated with lung stress while Enghoff's formula was impacted by the shunt effect. Burki reviews the history of deadspace measures, initially described in 1891. He notes that the animals were hypercarbic and acidotic, possibly impacting V_D/V_T measures. Importantly, he reinforces the utility of V_D/V_T measures during mechanical ventilation and the role of V_D/V_T in predicting prognosis.

Gaspari et al compared high-flow nasal cannula (HFNC) to traditional O_2 therapy with an air-entrainment mask following extubation in liver transplant subjects. Using a historical control, they evaluated the incidence of hypoxemia at 1 h and 24 h post-extubation. They found that application of HFNC did not reduce the incidence of hypoxemia after extubation compared to standard O_2 and did not modify the incidence of weaning failure, ICU length of stay, or 28-d mortality in this high-risk population. Littleton provides commentary suggesting HFNC has both potential advantages and shortcomings which require larger studies in more heterogenous populations.

Yanez and others evaluated oropharyngeal oxygen concentrations (F_{IO_2}) delivered via different oxygen appliances in a group of healthy volunteers. They delivered oxygen at 15 L/min via simple mask, non-rebreather mask, OxyMask, and a closed mask with a Jackson Rees circuit. Comparisons between delivered F_{IO_2} at the lips and in the oropharynx were made. They demonstrated significant differences between systems and between measurement sites. They concluded that at normal breathing patterns oropharyngeal oxygen delivery was dependent on the device, with the largest discrepancies seen with the OxyMask.

Proportional assist ventilation (PAV) was introduced nearly 30 years ago, but its use has been limited by clinician understanding. Amargiannitakis performed a retrospective analysis of PAV using an algorithm to titrate support based on noninvasive estimates of inspiratory output and inspiratory effort. They used waveforms to compare these estimates to measures of transdiaphragmatic pressure and pressure time product. The algorithm had limited accuracy in estimating inspiratory muscle effort (a sensitivity and specificity of 81.2% and 58.1% respectively) and determining the appropriate level of assistance.

Zhang et al evaluated patient-ventilator synchrony during noninvasive ventilation (NIV) in COPD subjects using both pressure support ventilation (PSV) and PAV. Using diaphragmatic electromyogram signals they evaluated expiratory cycle delay and maximum value of flow and pressure. The found that the expiratory cycle delay of noninvasive PAV was longer than that of noninvasive PSV. They also noted that the lag time between neural respiratory drive and airway pressurization was increased and that "runaway" was observed during PAV.

Shah and others compared NIV with neurally-adjusted ventilatory assist (NAVA) versus NIV PSV in 40 subjects with COPD exacerbation. Gas exchange, asynchrony index, duration of NIV, and NIV failure were compared between groups. They reported that NIV with NAVA was associated with better patient-ventilator synchrony, but found no differences in gas exchange, duration of NIV, hospital length of stay, or rate of NIV failure.

Babic and Chatburn compared automated control of cuff pressure to manual control in a bench model using 3 devices over a 12-h period. They noted oscillations in airway pressures associated with ventilation and improved stability in cuff pressures with use of automated control. They conclude that automated devices do not regulate ventilatory pressure oscillations but do control mean cuff pressure at the desired threshold.

Ogrodnick and colleagues evaluated the health literacy of first year respiratory therapy students. They used a pre and post knowledge and beliefs survey and 1-h teach-back skills training to confirm patient understanding and proper use of medical devices. They conclude that respiratory therapy students may benefit from a 1-h health literacy and teach-back skills training, and that communication skills might be an important component of student training.

Madden and others describe a case series using carbogen for apnea testing during brain death declaration for subjects on extracorporeal membrane oxygenation (ECMO). They developed an algorithm for determining the desired P_{aCO_2} goal while maintaining subjects on mechanical ventilation and ECMO. They conclude that the carbogen method for apnea testing during brain death declaration was accurate in predicting the end-point of the apnea test.

Goel et al describe a retrospective cohort study of the use of NIV for acute respiratory failure in the ED. They extracted data from the medical records of 432 subjects requiring invasive ventilation, a quarter of whom were given a trial of NIV. They found that NIV exposure prior to invasive ventilation was not associated with an increased risk of persistent organ dysfunction or death. However, in a subset of subjects exposed to extended NIV use (>4 h) prior to invasive ventilation there was an increased risk of organ dysfunction and in-hospital mortality.

Nunez and Hassinger describe the predictors of successful response to negative pressure ventilation (NPV) in pediatric subjects with acute respiratory failure. This retrospective review included subjects admitted to the pediatric ICU during a 12-month period. The study included 118 subjects; the most common causes of respiratory failure were bronchiolitis and pneumonia. They found that NPV supported 69% of subjects with respiratory failure primarily due to pulmonary infection. Oxygen requirements were lower in subjects who responded to NPV within 1 h of initiation.