

This month's Editor's Choice is a study of noninvasive oxygenation strategies in subjects with acute hypoxic respiratory failure due to COVID-19. Menga et al review their use of high-flow nasal cannula (HFNC) and helmet noninvasive ventilation (NIV) in COVID-19. They report outcomes of 85 subjects, 52 (61%) of whom required intubation and invasive ventilation. Failure was associated with greater severity of illness and elevated serum lactate dehydrogenase. Failure was significantly greater in hypoxemia due to COVID-19 compared to other causes of hypoxic respiratory failure. Hill and colleagues provide an accompanying editorial discussing the unique aspects of COVID-19 and the causes of NIV and HFNC failure based on underlying physiology.

Miller and others describe burnout and resilience resources in respiratory therapy (RT) departments in the wake of the COVID-19 pandemic. They used an online survey designed to determine the key drivers of burnout among therapists. Of 221 responses, 72% of respondents reported experiencing burnout, yet only 10% of RT departments measured burnout. Drivers of burnout included poor leadership, high workloads, and insufficient staffing. Resilience resources were not commonly accessed but employee assistance and wellness programs were common. Evans opines that the stress and workload created by the COVID-19 surge strained employee wellness and coping capabilities. She recommends development of programs to manage these stressors.

Wiert and others describe the use of prone positioning in spontaneously breathing mechanically ventilated subjects with moderate and severe ARDS. This retrospective analysis evaluated 39 subjects, half with COVID-19 ARDS. Prone position was evaluated in 84 episodes with subjects on pressure support (PS) and 29 episodes with subjects on volume assist control. Both groups experienced similar improvements in oxygenation and similar sedation needs, but subjects on PS were far less likely to require neuromuscular blockade. LaVita and De Santis Santiago comment that prone position is clearly an important therapy in moderate to severe ARDS. They caution that prone position in non-intubated patients and spontaneously breathing patients adds complexity and that this move should not be taken lightly.

Fontela et al prospectively evaluated the Medical Research Council (MRC) scale and handgrip strength in subjects undergoing a spontaneous breathing trial (SBT) in a multicenter trial. Only the MRC score predicted SBT failure and prolonged mechanical ventilation. Handgrip strength was associated with acquired muscular weakness but not SBT outcomes.

Lodise and colleagues evaluated 30-d readmission rates following mechanical ventilation for Gram-negative pneumonia using a large national database. They mined the Healthcare Cost and Utilization Project National Readmission Database of over 32,000 subjects. Logistic regression models were used to evaluate subject characteristics associated with mortality and readmissions. Mortality rate was 24% during the initial admission and readmissions occurred within 30 d in 20% of survivors. Readmissions occurred within the first week in 40% of cases and within the first 2 weeks in 65% of subjects. Mortality was high and readmissions frequent among the study group.

Sammour and Chatburn performed a bench study of inspiratory rise time during PS in a lung model representative of bronchopulmonary dysplasia. They evaluated 3 ventilators at identical settings but varied rise time across the range of the device. They found that adjusting rise time improved the balance of volume delivery between test lung units, but resulted in a reduction in tidal volume.

Sojar and others describe modification of a portable ventilator with an external exhalation valve to allow shared ventilation. The system was tested in a lung model and independent settings for each test lung were verified. The modifications allowed for successful separate PEEP, V_T , and F_{IO_2} for each model.

Zampogna and others evaluated the 5-repetition sit-to-stand test (STS) to evaluate pulmonary rehabilitation in subjects with asthma. In a study of 103 subjects with asthma and 108 with COPD, they compared the STS with other measures to assess rehabilitation outcomes. They concluded that the 5-repetition STS was a reliable outcome measure of pulmonary rehabilitation for subjects with asthma.

Loberger et al retrospectively evaluated extubations in the pediatric ICU to determine the impact of daytime versus nighttime success. They studied 517 subjects and found no difference in success between daytime and nighttime extubations. They observed that surgical airway diagnoses extubations were more commonly accomplished on the day shift. The authors conclude that ventilator liberation should not be delayed by time of day.

Raimundo and coworkers compared the impact of closed versus open endotracheal suctioning in mechanically ventilated subjects. Using a crossover design, they evaluated pulmonary mechanics and hemodynamic variables before and after suctioning. They found that open circuit suctioning was associated with elevated airway resistance and suggest that closed suctioning might have advantages.

Sagishima et al evaluated the duration of apnea testing for brain death determination to see if a shorter period of observation was sufficient. They determined the rate of increase in partial pressure of carbon dioxide (P_{aCO_2}), stratifying subjects by body temperature and partial pressure of oxygen. Their results suggest the time for determining brain death could be predicted by measuring the rate of P_{aCO_2} increase.

Peña-López and others performed a secondary analysis of a pediatric multicenter prospective study of ventilator-associated events (VAEs). Ninety subjects ventilated >48 h were included and VAE was defined per CDC guidelines. VAEs were documented in 24 instances and use of continuous short-acting sedative-analgesic agents was a strong protective factor against VAEs. The authors concluded that these sedatives should be preferred in the pediatric ICU.

Lersritwimanmaen et al evaluated the use of high-flow humidified oxygen in subjects with a tracheostomy and conventional oxygen delivery by a T-piece compared to PS ventilation in a crossover study. Observations were made over a 30-min trial and cardiorespiratory variables recorded. In this cohort there were no measurable advantages of high-flow oxygen compared to a T-piece.

Wernly and others used a retrospective, propensity-adjusted analysis to compare outcomes in elderly and very elderly mechanically ventilated subjects in the ICU. Subjects > 80 y old were compared to subjects between 65 and 79 y. The oldest group had a greater severity of illness and more frequent requirement for plateau pressures > 30 cm H₂O. The 28-d mortality was 20% greater (but remained < 50%) in the oldest subjects, and was an independent risk factor for death.

Burr et al evaluated twice daily respiratory care department huddles on collaborative problem-solving. The authors sought to identify process improvement (PI) opportunities and bring problems to quick resolution. They identified over 350 PI opportunities, half of which were handled within the department and half that required multidisciplinary action. They suggest that twice daily huddles facilitated PI identification and resolution.

Aquino and others evaluated the impact of home compressors used by subjects with cystic fibrosis on nebulizer function. They measured nebulization efficiency with each of 146 compressors. They determined that 39% of compressors were ineffective, not providing sufficient pressure and flow to aerosolize medication from the nebulizer.

Zhou et al evaluated the impact of a standardized protocol for treatment of hypoxemia and outcomes in subjects requiring venovenous extracorporeal membrane oxygenation (ECMO). This before and after trial compared outcomes after implementation of a refractory hypoxemia protocol. Post-protocol, more subjects received prone positioning and fewer received high-frequency oscillation. Pre ECMO plateau pressures were lower and post ECMO driving pressures were reduced. The authors concluded that the protocol improved compliance with lung protective approaches.

Miller and colleagues provide a narrative review of high-frequency jet ventilation (HFJV) in neonatal and pediatric subjects. Differences in HFJV and high-frequency oscillation are highlighted and future research needs described. Sengbusch et al contribute a systematic review on the impact of smoking on maximum oxygen consumption. Fagevik Olsén describe the function of positive expiratory pressure devices with and without oscillation in a systematic review.