

This month's Editor's Choice is a paper by Haaksma and others evaluating respiratory muscle thickness in subjects with COVID-19. Subjects with COVID-19 requiring mechanical ventilation for < 2 h had an initial ultrasound examination of the diaphragm, rectus abdominis, and lateral abdominal wall muscles followed by daily measures up to 8 evaluations. In 30 subjects, the changes were evenly distributed between no change, a decrease in thickness, and an increase in thickness of the diaphragm. A mixed effect linear regression showed an association of atrophy with neuromuscular blockade. Morris and Goligher opine that ultrasound may be a key to a future paradigm of both lung- and diaphragm-protective ventilation for respiratory failure.

Webb and colleagues performed a retrospective evaluation of the ROX and ROX-HR index to predict high-flow nasal cannula (HFNC) failure in the pediatric intensive care unit (PICU). Over a 36-month period they evaluated 446 patient encounters with a HFNC failure rate of 25%. Failure was associated with lower ROX and lower ROX-HR scores, similar to adults. They concluded that the ROX-HR score could be effective at predicting success of HFNC in children < 24 months of age. Rogerson and Cater provide comment noting the increased use of HFNC in pediatrics but also reminding us of the challenges of using adult metrics in pediatrics where the high variability in vital signs across ages represent a more heterogeneous population. They encourage further prospective research on these indices across a wide range of pediatric ages.

Loberger and colleagues describe a quality improvement initiative in the PICU evaluating a bundled extubation readiness and analgosedation protocol. Following implementation, benzodiazepine use was reduced by 75% and duration of ventilation was reduced by 23%. However, no differences were observed in PICU days, narcotic withdrawal, or delirium treatment. Rehder and Heath provide comment that the findings in this trial suggest that future studies in pediatrics should consider the ABCDEF bundle which has been successful in adults. They also note that the Loberger results cannot determine which of the interventions was associated with the observed improvement.

Willis et al retrospectively reviewed the application of a score-based albuterol therapy pathway in children with asthma. Over 2 years, children > 2 y old admitted to the PICU or step-down unit receiving continuous albuterol were studied. Subjects were managed using the pediatric asthma score and dose and duration of albuterol use, complications and length of stay were evaluated. Intubation was infrequent and readmissions within 30 days < 1%. They concluded that a respiratory therapist (RT)-driven, score-based pathway for initiation and discontinuation of continuous albuterol for treatment of pediatric asthma exacerbation was safe and effective.

Nickel and others describe a model to simulate intrinsic PEEP which can be used to evaluate and ameliorate asynchrony. Expiratory resistance was increased as a given breathing frequency to create air-trapping. Increases in muscle pressure were required to overcome the intrinsic PEEP demonstrating the utility of the model.

Jesus et al performed a cross-sectional study of informal caregivers of patients requiring home oxygen therapy. Using validated surveys they evaluated dyspnea, caregiver burden and quality of life. They found that increased caregiver burden was associated with greater physical limitations due to patient dyspnea, resulting in a poor quality of life for the caregiver.

Quach and others performed a Delphi survey of Canadian RTs regarding recently published guidelines on pediatric mechanical ventilation. They evaluated 59 practice statements achieving consensus at round 3 on ten sections. Their findings suggest that RT perspectives aligned closely with the guidelines.

Altayar et al evaluated ultrasound evaluation of the diaphragm and electromyography (electrical activity of the diaphragm [EAdi]) for determining weaning success. Subjects invasively ventilated for > 48 h scheduled for a spontaneous breathing trial (SBT) were studied. During the initial 5 min of the SBT, mean values of Δ EAdi (EAdi peak – EAdi minimum), tidal volume, and breathing frequency were measured. Ultrasound examination of the diaphragm and assessment of diaphragmatic excursion and diaphragmatic thickening fraction were recorded 30 min after initiation of SBT. They found that diaphragmatic electromyography indices were inferior to diaphragm ultrasonography in prediction of ventilator liberation outcome.

Raboni and others evaluated factors predicting the success of HFNC in COVID-19 in an observational study. They evaluated 128 subjects over 6 months with a HFNC success rate of 53%. Variables associated with failure included an elevated Charlson comorbidity index, higher F_{IO_2} , and higher flow requirement. Failure occurred in the first 24 h of therapy, was associated with mortality, and was predicted by ROX score < 3.5. They concluded that HFNC use requires close monitoring to determine which patients require escalation of ventilatory support.

Schieffer and others provide a short report on the impact of complications and code status downgrades in COVID-19. They investigated the relationship of high mortality rate, pre-existing disease, and complications to decisions related to palliative care during the pandemic.

Cousin et al evaluated the impact of high PEEP on intrapulmonary shunt in subjects with COVID-19. They found that two-thirds of subjects responded to PEEP with recruitment and reductions in intrapulmonary shunt. They did not demonstrate two different phenotypes of COVID-19 as has been postulated by others.

Khan and colleagues compared oscillometry to standard spirometry in volunteers following chest wall strapping. They found that oscillometry effectively determined the decrease in compliance without requiring the subject effort necessary for spirometry.

Wang and others contribute a systematic review on inspiratory muscle training on respiratory function in asthma. Miller and Scott contribute a year in review on pediatric mechanical ventilation. This review highlights the important publications in this area in the last 12 months.