

This month's Editor's Choice is a bench study evaluating the transnasal aerosol delivery during high-flow nasal cannula (HFNC). Li and colleagues determined drug delivery to a filter positioned in the simulated trachea of a manikin. They varied the type of HFNC device, HFNC circuit, and position of either a vibrating mesh nebulizer (VMN) or small volume nebulizer (SVN) in the circuit. They reported greater drug delivery when the nebulizers were placed at the humidifier and the VMN outperformed the SVN.

Beuvon and others evaluated bronchodilator delivery (salbutamol) via HFNC in subjects with an exacerbation of COPD. Using a crossover design, 15 subjects performed pulmonary function tests during HFNC alone, and again with HFNC with salbutamol via a VMN. The primary endpoint was the change in FEV₁ and secondary endpoints included changes in forced vital capacity (FVC), peak expiratory flow (PEF), airway resistance, and clinical parameters. Following salbutamol nebulization there were small but statistically significant increases in FEV₁, FVC, and PEF.

Saunders and Davis consider both studies and provide insight into the role of aerosol delivery during HFNC. They also note that transnasal delivery of certain drugs, specifically vasodilators, have the risk of absorption in the nasopharynx and systemic drug accumulation.

Droege et al measured serum tobramycin concentrations in mechanically ventilated subjects receiving inhaled tobramycin for ventilator-associated pneumonia. They categorized 52 subjects as having detectable or undetectable serum tobramycin concentrations and monitored subjects for acute kidney injury (AKI). Detectable serum tobramycin was found in 66% of subjects and was associated with higher PEEP, older age, and higher serum creatinine before treatment. Nine subjects developed AKI which was associated with greater severity of illness. They concluded that at-risk patients should receive serum monitoring to prevent unintended injury. Dhand contributes an accompanying editorial discussing the complicated nature of aerosolized antibiotics, the search for a clinical indication, and the impact of nebulizer efficiency on drug delivery.

Krzyewski et al evaluated pressure injuries (PI) in infants receiving noninvasive ventilation (NIV) following implementation of a multifaceted skin care bundle (SCB). This quality improvement study evaluated PI prior to initiation of an NIV guideline, after NIV guideline implementation, and following the SCB. Following increased use of NIV, there was also a significant increase in PI. The introduction of the multidisciplinary SCB reduced PI by 79%.

Alhashemi and others performed a retrospective cohort study of a decannulation protocol in tracheostomy subjects over a 2-year time frame. Over half of subjects failed capping on multiple attempts and remained tracheostomized. A third of subjects were successfully decannulated. The median time to decannulation was 47 days. Predictors of long-term tracheostomy were reduced mental status, ≥ 2 comorbidities, and female sex.

McCoy and colleagues developed a tracheostomy care simulation program for caregivers of tracheostomized children. The simulation included 4 emergency scenarios: accidental dislodgement, plugging, cardiac arrest, and ventilator failure. Following participation in the program, caregiver knowledge, confidence, and comfort levels increased. They concluded that medically fragile patients with tracheostomy require caregiver education with a focus on responding to emergencies.

Oliveira et al prospectively evaluated 66 subjects with COVID-19 receiving noninvasive respiratory support including oxygen therapy, HFNC, and NIV during awake prone positioning. Subjects were divided into responders and nonresponders (20% increase in P_aO₂/F_IO₂) before and after the maneuver. Responders showed an increased S_pO₂, P_aO₂, and P_aO₂/F_IO₂ with the maneuver and reduced breathing frequencies. Responders had shorter lengths of stay in the ICU and hospital, lower intubation rates at 48 h, fewer days of ventilatory support, and lower mortality. Subjects who responded to prone position had a 54% reduction in the risk of intubation and prolonged stay in the ICU.

Doers and others evaluated the Ottawa COPD Risk Scale (OCRS) to predict short-term serious adverse events (SAEs) among patients in the emergency department with COPD exacerbations. They studied 246 subjects who had a hospitalization rate of 52% and experienced SAEs at a rate of 19%. They found that the OCRS did not reliably predict SAEs in this population. Three risk factors were associated with 30-d SAE: triage P_{CO}₂, Charlson comorbidity index, and hospitalization within the previous year. They recommend development of scores for a U.S. population.

Espersen et al evaluated lung ultrasound (LUS) scores in 215 subjects with COVID-19 evaluating 8 lung zones. Images were analyzed offline, blinded to clinical variables and outcomes. Most subjects (81%) had pathologic LUS findings in ≥ 1 zone (≥ 3 B-lines, confluent B-lines, or consolidations). LUS findings and score did not differ significantly between subjects with the composite outcome and those without, and were not associated with outcomes in unadjusted and adjusted logistic regression analyses. They concluded that pathologic findings on LUS were common at a median of 3 d after admission and did not differ among subjects who experienced the composite outcome of incident ARDS, ICU admission, and all-cause mortality compared to subjects who did not.

Andreu and co-workers compared two extubation techniques: continuous endotracheal suction during tube removal and positive pressure during tube removal. This multicenter randomized controlled trial evaluated major complications postextubation, defined as the clinical evidence of desaturation, upper airway obstruction, or vomiting. In a study of 725 subjects, 26% exhibited at least one major complication. There were no differences between groups. They concluded that both techniques may be safely used during extubation in critically ill adult patients.

Cui and others provide a narrative review on ergonomics and personalization of NIV face masks. They suggest guidelines for mask selection and troubleshooting during mask use as well as ergonomic approaches including face anthropometry, sizing systems, mask design, evaluation, and personalization. Pavlov and others provide a systematic review of awake prone positioning in subjects with acute hypoxemia with COVID-19. They found a consistent improvement in oxygenation but no change in the requirement for intubation. Study heterogeneity complicates these findings.

AARC Clinical Practice Guidelines covering the management of oxygen in adult patients in acute care are authored by Piraino and the guideline committee. Mireles-Cabodevila and colleagues contribute a special article on patient-ventilator interactions and how to interpret ventilator waveforms.