This Month's Editor's Choice is a bench evaluation of the addition of a filter to reduce exhaled aerosol during methacholine delivery for bronchoprovocation testing. Subat et al propose the addition of a viral filter to reduce environmental contamination as a mitigation for virus spread. They used two different nebulizers and compared the delivered dose with and without the filter in line. They found that the addition of a viral filter to the nebulizer exhalation limb did not affect methacholine dose. They suggest that routine use of a viral filter should be considered to improve pulmonary function test (PFT) safety and infection control measures. Haynes provides an accompanying editorial stating that this type of PFT lab personnel protection is long overdue. Exposure to exhaled pathogens is of course a concern in the midst of SARS-CoV-2, but exposure to aerosolized bronchodilators may also impact caregivers.

Gogniat and others describe the use of electrical impedance tomography (EIT) to identify lung strain in an ovine model of ARDS. They evaluated EIT images at a fixed tidal volume and PEEP from 0–15 cm H_2O in 5 cm H_2O increments. With increasing PEEP, respiratory compliance improved and driving pressure fell. The center of ventilation and end expiratory lung impedance determined by EIT were used to develop maps of dynamic relative regional lung strain. EIT showed high strain in ventral lung zones at low PEEP as the result of overdistension of the baby lung. Barbas and Amato provide accompanying commentary. They suggest that the bedside use of dynamic strain maps in real time could guide personalized mechanical ventilation settings, potentially reducing ventilator-induced lung injury.

Lee and others compared aerosol delivery from a breath enhanced nebulizer and a vibrating mesh nebulizer placed on the inlet of the humidifier with a heated wire circuit during mechanical ventilation. Radiolabeled aerosol was nebulized and the output measured in real time. Results were comparable with both devices, but they found that inspiratory flow and pump flow were directly related to delivered aerosol. There were no differences in system losses. They concluded that aerosol delivery during continuous infusion and bolus delivery was comparable between devices and determined by pump flow and initial ventilator settings. Placement of either nebulizer on the inlet of the humidifier reduced expiratory losses. Berlinski provides comment, noting the limited study conditions and the in vitro nature of the study. He reminds us that change in position of the nebulizer doesn't necessarily dictate a change in our position on practice.

Garcia and co-workers performed a retrospective study of the use of high-flow nasal cannula (HFNC) and noninvasive ventilation (NIV) in over 13,000 subjects in the VIRUS COVID-19 registry. Associations of HFNC and NIV use with clinical outcomes were evaluated using multivariable adjusted hierarchical random effects logistic regression models. They found that 60% of subjects received conventional oxygen therapy, 21% received HFNC, and 7% received NIV. Half of subjects initially managed on HFNC or NIV did not receive invasive ventilation. The initial use of HFNC or NIV was not associated with intubation or mortality.

Ratti and others randomized tracheostomized subjects to receive standard of care or inspiratory muscle training (IMT). Standard of care was spontaneous breathing via a T-piece. Work of breathing metrics and outcomes were recorded. Weaning time was not different between groups and weaning success was reduced in the IMT group. Maximum inspiratory pressure, power, and energy were all higher in the manual IMT group. They concluded that IMT had no impact on weaning times or weaning success.

Fernandez et al measured the pressure generated in the first 100 ms of inspiration ($P_{0.1}$) in subjects receiving NIV at home with COPD and obesity hypoventilation syndrome (OHS). $P_{0.1}$ was measured at study initiation and at 6 months. In the OHS group, $P_{0.1}$ did not change over time while the COPD group had a small decrease in $P_{0.1}$. They concluded that COPD and air trapping were associated with greater $P_{0.1}$ as a marker of respiratory effort.

Kyle and others performed a single center retrospective review of pediatric subjects with acute respiratory failure receiving invasive ventilation and NIV. In 170 subjects, 65 were treated successfully with NIV, 55 failed NIV, and 50 were intubated at presentation. Intubation after NIV failure occurred in < 2 hours. Of subjects meeting Pediatric Acute Lung Injury Consensus Conference (PALICC) pediatric ARDS criteria, only (14%) were successfully treated with NIV. They found that pediatric subjects failing NIV did not experience longer durations of mechanical ventilation or fewer ventilator-free days.

Faure et al performed a retrospective study of patients with ARDS and COVID-19 who required tracheostomy and prolonged mechanical ventilation admitted to a weaning center. In a small group of 43 subjects, time to decannulation was 9 days. The Medical Research Council (MRC) score was the only variable associated with early decannulation. Three months after admission 40 (93%) of subjects were liberated from mechanical ventilation and 36 returned home. Their results suggest that MRC score at admission predicted early decannulation and limb muscle strength recovery.

Rogerson and colleagues reviewed the use of HFNC in pediatric subjects with bronchiolitis, asthma, and pneumonia from a large statewide database. Over a 10-year period, HFNC use increased by 400% across all three diagnostic categories. Gender, race, age, and ethnicity all significantly influenced the likelihood of HFNC use. They concluded that HFNC use was no longer confined to bronchiolitis and that several factors impact HFNC use.

Kopstick and coworkers used a mixed-methods retrospective analysis of pediatric subjects with respiratory failure to evaluate the use of PALICC recommendations for care in this cohort. They compared provider recognition of ARDS and use of lung protective therapies and outcomes. In nearly 2,000 subjects they found that 16% of subjects met the definition of ARDS but only 30% of these were identified by providers. Older age, severe hypoxemia, and bone marrow transplant recipients were more commonly identified as having ARDS. Lung protective practices did not differ based on provider recognition. They concluded that pediatric ARDS was common but only recognized in a minority of cases.

Privitera et al performed a bench study of filters added to a CPAP system delivered by a helmet interface. They used two different Venturi CPAP systems at variable flow and F_{IO_2} combinations. Filters were placed at the flow source and at the helmet inlet port. The addition of filters resulted in a decrease in total flow from 1–13% and an increase in F_{IO_2} of 0.05. They suggest that if filters are used, F_{IO_2} should be monitored and flow adjusted to maintain patient comfort.

The New Horizons Symposium reviews lessons learned from the COVID-19 pandemic and includes reviews of shortages and vulnerabilities of hospital oxygen systems, the use of prone positioning in ventilated and non-ventilated subjects, and concerns regarding aerosol-generating procedures and virus transmission.

Swingwood et al contribute a narrative review of mechanical insufflation-exsufflation (MI-E) use in critically ill subjects during invasive ventilation. They found that the main barrier to MI-E use in critically ill subjects was a lack of knowledge and skills by caregivers. This is an area ripe for investigation as the current lack of evidence precludes recommendations related to best practices.