

This Month's Editor's Choice by Tisminetzky et al evaluates ventilatory ratio as a predictor of mortality in subjects with ARDS who underwent prone positioning. They measured driving pressure, P_{aO_2}/F_{IO_2} , P_{aCO_2} , and ventilatory ratio defined as $[\text{minute ventilation (mL/min)} P_{aCO_2}(\text{mm Hg})]/[\text{predicted body weight} \times 100 (\text{mL/min}) \times 37.5 (\text{mm Hg})]$. In a cohort of 156 subjects the mortality rate was 53%. They found that a fall in ventilatory ratio at 24 h was associated with lower mortality (OR 0.8), while other physiologic parameters were not related to ICU mortality.

Siegel and others also studied the prognostic value of ventilatory ratio in subjects with ARDS. In a single center observational study they recorded ventilatory ratio, APACHE III score, and severity of shock as measured by the number of vasopressors required at baseline. In 50 subjects, they found that ventilatory ratio significantly improved prognostic value of other predictors. Ventilatory ratio, when combined with indicators of systemic illness, improved mortality prediction. Blanch and colleagues comment on these two papers evaluating ventilatory ratio. They suggest that the ventilatory ratio is a good global index of the efficiency of lung gas exchange. Ventilatory ratio is closely related to dead space to tidal volume ratio, which is a predictor of outcome in ARDS.

Lacasse and coworkers developed a simulation model to evaluate cost-effectiveness of in-home respiratory therapist (RT) visits for subjects receiving home O_2 therapy. The primary outcome was the ratio of incremental cost per quality-adjusted life years (QALY) gained. Over a 5 year period the extended home visit program might prevent 9 deaths and add 39 years of life and 24 QALYs. The incremental cost was \$17,000. They concluded that the extended in-home visit model could improve adherence to home O_2 therapy and prove cost effective. Hess advocates for in-home RTs for patients on O_2 . He notes that the goal of home O_2 therapy is to return patients to normal activities and argues that competitive bidding has failed to consider patient quality of life. He suggests RT home visits could improve O_2 therapy and aid patient understanding.

Goel et al performed a multicenter retrospective review of subjects with COVID-19 requiring ICU admission in a large urban health system. In a cohort of 634 subjects, 70% were managed on low flow oxygen, 17% on high-flow nasal cannula (HFNC) or noninvasive ventilation (NIV), and 9% received invasive ventilation. They found that higher workloads, older age, and presence of comorbid conditions increased the chance of receiving invasive ventilation. With increased workload, subjects were 6-8 times more likely to be initially managed with HFNC or NIV.

Zingg and others evaluated respiratory system compliance and oxygenation indices in a cohort of trauma subjects to determine the impact of pulmonary contusion on lung function. In 301 invasively ventilated trauma subjects, over half had severe pulmonary contusion. The mean duration of ventilatory support was 10 days. Subjects with hypoxemia had progressive hypoxemia through day 5 of invasive ventilation. Severe pulmonary contusion was associated with worse oxygenation indices even when corrected for blood and fluid administration. They concluded that contusions play an important role in the course of acutely injured subjects requiring mechanical ventilation.

Panyarath et al evaluated NIV using pressure control breaths or adaptive pressure breaths in subjects with amyotrophic lateral sclerosis (ALS). Subjects were studied for one week and data were downloaded from the ventilator. They found no difference in RT visits between modes but found improved adherence with standard pressure control ventilation. Adherence improved with time; there was no difference at 6 months. They also found higher residual apnea-hypopnea index and fewer spontaneously triggered breaths with adaptive pressure breaths at 6 months. They concluded that adaptive pressure breaths required more time for subjects to adapt and may result in greater upper airway stability in ALS subjects with bulbar disease.

Cater and others evaluated NIV use prior to intubation in a cohort of pediatric subjects following bone marrow transplant. They performed a retrospective multicenter study over 5 years in 211 subjects. Subjects

initially exposed to NIV were diagnosed with respiratory distress more often, had higher ICU mortality, and fewer ventilator-free days. They also had higher rates of pediatric ARDS. They concluded that NIV use prior to intubation was associated with worse outcomes.

Guérin and others performed a bench study of the effect of HFNC devices on the work of breathing in a model. They tested 7 devices at flows 20–60 L/min, 3 simulated efforts, and 2 breathing frequencies. They found only small differences in device performance related to PEEP and work of breathing, which did not appear to be clinically important.

Moretto and colleagues performed a retrospective observational study of subjects receiving HFNC or CPAP on the general wards over one year. The majority received CPAP, and half had either cardiogenic pulmonary edema or pneumonia. Subjects were managed on the general wards by a rapid response team over a mean of 3 days. Pressure injuries from device interfaces occurred in 13% of subjects. Subjects < 80 y old had longer hospitalizations and decreased mortality vs those \geq 80 y old. The authors concluded that NIV and CPAP on the ward was safe and effective.

Lellouche et al describe the performance of heated humidifiers and the impact of increasing heater plate temperature on delivered humidity. They measured heater plate temperature, inlet temperature, and delivered humidity at minute volumes of 5–15 L/min. They found a positive correlation between heater plate temperature and delivered humidity. Heater plate temperature $> 62^\circ\text{C}$ was a good predictor of absolute humidity delivered $> 30 \text{ mg H}_2\text{O/L}$. They suggest that heater plate temperature should be used as a surrogate of humidity to improve the humidification monitoring.

Raft and coworkers compared arterial cannulation success in a model using standard palpation and ultrasound guidance in a randomized crossover study. Subjects were trained on ultrasound-guided technique with low blood pressure, palpation-guided technique with high blood pressure, and a secondary comparison with low blood pressure. All subjects were naïve to arterial cannulation. Ultrasound was associated with greater cannulation success for subjects performing their first arterial cannulation. There were no differences in time to successful cannulation.

O'Doherty and others surveyed subjects with cystic fibrosis regarding their adherence to aerosol therapy and nebulizer cleaning regimens while traveling. Of 68 respondents, 38% indicated they did not continue aerosol therapy while traveling. Of those who continued aerosol therapy, 43% cleaned the nebulizer with soap and water, 18% used boiling water, and 2% did not clean the nebulizer until their return. They concluded that nebulizer care and hygiene is sub-optimal during travel in this population.

Mirza and others provide a short report on predictors of treatment success in subjects with COVID-19 undergoing awake prone positioning. In this retrospective post-hoc analysis they found that greater P_{aO_2}/F_{IO_2} prior to prone positioning and improved P_{aO_2}/F_{IO_2} at day 2 were associated with avoidance of invasive ventilation.

Damiani et al contribute a short report on the impact of reducing ventilator rate in subjects with COVID-19 and hypoxemic respiratory failure. In subjects with COVID-19 associated ARDS, respiratory frequency could be reduced, while maintaining adequate pH and P_{aCO_2} , at a decreased minute ventilation and mechanical power.

Beran and others contribute a systematic review of HFNC and NIV in COVID-19. They included 19 studies with 3,606 subjects. NIV was associated with a greater improvement in P_{aO_2}/F_{IO_2} compared to HFNC, but intubation rates and hospital length of stay were similar. They found no difference in mortality between HFNC and NIV in a subgroup of randomized controlled trials. Luo provides an accompanying editorial detailing the importance of well-designed and properly executed clinical trials on the veracity of meta-analyses and systematic reviews.

Evans and colleagues contribute AARC Clinical Practice Guidelines on capillary blood gas sampling in neonatal and pediatric patients. This work provides evidence-based best practices for safety and efficacy of capillary blood sampling.