

Editor's Commentary

Our Editor's Choice paper describes a respiratory therapist disease management program for subjects hospitalized with COPD. Silver et al evaluated whether such a program would reduce re-hospitalization and emergency department visits in a prospective, single-center, unblinded, randomized trial. Their program was associated with fewer readmissions, fewer ICU days, and shorter hospital stays due to COPD exacerbations. Derdak points out that this study adds to the growing evidence supporting use of a structured, pre-discharge comprehensive disease-management approach for high-risk patients admitted for COPD exacerbations. Respiratory therapy departments can use this study as an example of how to develop a program to prevent COPD readmissions, improve patient care, and reduce costs.

Itagaki and colleagues conducted a bench study to evaluate the performance of leak compensation in all-age ICU ventilators during volume-targeted neonatal ventilation. They found that only the Puritan-Bennett 980 and the Dräger V500 ventilators acclimated to all leak scenarios to achieve volume-targeted ventilation. The authors suggest that further clinical investigation is needed to validate the use of leak compensation during neonatal volume-targeted ventilation. As pointed out by De Luca et al, these results will help clinicians decide which ventilators best meet their expectations and allow them to minimize the risk of noninvasive ventilation (NIV) failure.

In a second study by Itagaki and colleagues, the authors conducted a bench study to evaluate the effects of leak compensation on patient-ventilator synchrony during premature/neonatal simulated invasive ventilation and NIV. The ability of leak compensation to prevent asynchrony varied widely between ventilators and lung mechanics. The Puritan-Bennett 980 and the Dräger V500 were the only ventilators able to acclimate to all leak scenarios for invasive ventilation, and PB980 was the only ventilator to acclimate to all leak scenarios in NIV.

Delgado and colleagues evaluated the performance of the new turbine critical care ventilators. They evaluated 7 ICU ventilators with pressure support levels of 10, 15 and 20 cm H₂O and with 2 PEEP levels of 5 cm H₂O and the minimum level allowed by the ventilator. They found that rate of pressurization and trigger functions were superior in the newest ventilators. The application of PEEP did not change the results.

Apnea of prematurity affects a small proportion, but large absolute number, of late preterm infants. Out-patient management is variably utilized despite relative clinical equipoise and potential for improved cost-effectiveness. Montenegro et al compared in-patient costs for discharge-delays apnea, bradycardia, and desaturation (ABD) events with hypothetical out-patient management. They found that out-patient management of discharge-delays ABD events in a late preterm and term population was a cost-effective alternative to prolonged in-patient observation.

The objective of the study by Sauthier and colleagues was to identify how prolonged mechanical ventilation (PMV) for children and neonates is described in the literature, and to outline pediatric/neonatal considerations related to PMV, with the goal of proposing a pediatric/neonatal adaptation to the definition of the National Association for Medical Direction of Respiratory Care. They propose a definition of pediatric PMV that incorporates the number of consecutive days of mechanical ventilation while taking into account use of NIV, lung maturity, and including short interruptions during the weaning process.

Chau et al review the management of children on long-term mechanical ventilation in Hong Kong over the past 2 decades. Their study showed a steady growth of children on long-term ventilation. These children have distinct demographic characteristics, underlying diseases, comorbidities and outcomes. Home care is feasible for the majority of these children. Prolonged survival of these children suggests the need to enhance transitional care to adult services.

Gowda and colleagues assessed the reliability of a vibrating mesh nebulizer suitable for use during mechanical ventilation. They found that the Aerogen Solo nebulizer was often randomly interrupted with a wide range of retained volumes.

To improve PETCO₂ measurement accuracy in a commercially available mask with a mainstream CO₂ detector, Napolitano et al implemented design changes with deform-and-hold shaping technology and anterior-posterior adjustment of the expiratory gas flow cup. They found that PETCO₂ measurement with the redesigned open-system facemask was accurate in the bench setting. The redesigned facemask maintained a good mask fit and accurate capnographic tracings in the majority of infants and children.

Phillips et al also evaluated techniques for interfacing capnography with supplemental oxygen masks. They evaluated the performance of 2 capnographic oxygen masks against a clinically expedient method using a standard oxygen mask with a flow-directed nasal cannula used for capnography in a spontaneous breathing model of an adult and child under conditions of normal ventilation, hypoventilation, and hyperventilation. Both of the specially designed oxygen-capnography masks provided reasonably stable PETCO₂ without significant rebreathing at the commonly used oxygen flows. Because of their open design, PETCO₂ measured at high oxygen flows may produce artificially lower readings that may not reflect PaCO₂ levels compared to lower oxygen flows.

In a third study related to PETCO₂ monitoring during spontaneous breathing, Takaki and colleagues compared the PETCO₂ measured using a newly developed oxygen nasal cannula with a CO₂-sampling port and PaCO₂ in extubated subjects after abdominal surgery. They also investigated whether the difference between PaCO₂ and PETCO₂ was affected by resting spontaneous breathing with the mouth consciously closed, and deep breathing with the mouth closed. PETCO₂ measurements with deep breathing and mouth closed with a capnometry-type oxygen cannula improved the prediction of PaCO₂ in surgical subjects without respiratory dysfunction.

The aim of the study by Vianna and colleagues was to compare the effectiveness of hyperoxygenation at 0.2 above baseline FIO₂ and hyperoxygenation with 100% oxygen in critically ill subjects on mechanical ventilation. They found that hyperoxygenation with FIO₂ 0.2 above baseline prevents hypoxemia. They also found transient changes in ventilation with open circuit suctioning using volumetric capnography analysis.

Chenelle et al conducted a bench evaluation of the performance of the PneuX system, with a comparison to 4 other endotracheal tube cuffs. The PneuX is a dedicated tracheal seal monitor. The PneuX cuff system generally exerted acceptable tracheal wall pressure, but the monitor allowed pressures exceeding 30 cm H₂O in some trials. The PneuX was the only endotracheal tube to prevent leak in all tests. Leak was reduced by the polyurethane cuff and PEEP, and eliminated by lubrication.