The Challenge of Prolonged Mechanical Ventilation: A Shared Global Experience

"No intervention better defines critical care than mechanical ventilation."[1] While underscoring the criticality of supporting vital respiratory function, technologic advances and economic reality have moved mechanical ventilation beyond the traditional critical care setting. Following the successful cardiac/coronary care unit experience, units and facilities that focus on respiratory care, particularly mechanical ventilation and weaning, are becoming more common in the United States,[2–6] Europe,[7–10] and Asia.[11] As an increasing number of intensive care unit (ICU) survivors have become "chronically critically ill," a growing population of patients requiring prolonged mechanical ventilation (PMV) is emerging.[12] Caring for and weaning these patients in an optimized yet cost-effective setting are challenges facing the medical establishment here and abroad. Experiences in the United States characterizing patients and reporting outcomes were recently reviewed.[13,14] In this issue of RESPIRATORY CARE Ceriana et al validate the shared global experience of PMV.[15]

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Ceriana et al address a "gap" in the Italian respiratory care continuum, reporting data from the first year of operation of a 7-bed respiratory intensive care unit (RICU) in a 350-bed rehabilitation hospital. Sixty-two of 96 patients (65%) were direct transfers from ICUs in a large urban area; 40 of the 96 patients (42%) were admitted for weaning. The RICU patients had a mean Simplified Acute Physiology Score II of 29. It is important to note that in a population that includes elderly, ventilator-dependent patients, a score of 29 does not indicate a particularly high severity of illness or multiple-organ dysfunction. Survival to discharge for the entire cohort was 87%. Ceriana et al should be lauded for systematically examining functional improvement and weaning from artificial airway—both important but under-reported outcome measures in this population. These functional gains almost certainly contribute to improved quality of life for these patients and help facilitate discharge to home.

The cohort was subsequently divided into 3 groups, based on goals of treatment. Complete data analysis for each group was not presented, complicating interpretation of the results. In the PMV weaning cohort the weaning strategy and the duration of mechanical ventilation prior to RICU admission approximated those of reports from the United States.[16] Twenty-seven of 40 patients (68%) were weaned, defined as no reinstitution of mechanical ventilation after 48 hours of spontaneous respiration. Though the number of PMV patients was too small for meaningful subgroup analysis, post-surgical and acute pulmonary disease patients fared best in weaning, as would be expected.

Ceriana et al emphasize a comprehensive and intense rehabilitation program as an integral part of their RICU interventions. Although the philosophy of this approach is apparent, the short weaning duration of 7.7 ± 4 days in the Ceriana et al study may primarily reflect clinicians' vigilance with regard to the RICU patient's readiness to wean, as well as assessment and treatment of reversible causes of respiratory failure, such as heart failure. A rehabilitative approach to weaning PMV patients has a sound physiologic basis and has long been advocated[17] but awaits further validation in a controlled trial.

Interpreting the results of any study of outcomes and cost, for benchmarking and comparison purposes, requires accepted, standardized definitions and reporting, and appropriate risk adjustment. Therein lies a major challenge for those working with the complexities and heterogeneity of the PMV population. We lack a uniform definition of "weaned" in published reports of PMV outcomes, which disallows even some of the most basic comparisons among units and/or facilities. Ceriana et al estimate the average per diem cost of an RICU bed to be about $800 in Italy. However, as that number was generated for the entire study population, and length of stay in the RICU is not reported, the cost of caring for and weaning the PMV cohort cannot be determined for comparison. Individual investigations have identified covariates of PMV outcome and subsequent survival, including physiologic variables, acuity measures, underlying diagnoses, comorbidities, premorbid functional status, and even the practice base (community or academic) of the attending physician.[18–21] Currently, there is at least one multicenter study in progress in the United States of weaning outcomes from PMV; only preliminary results have been reported.[22]

Regardless of the differences in reporting practices among published studies from several countries to date, the report by Ceriana et al[15] bears out what we know is

certain: our improved capability of supporting critically ill ICU patients has created a population of generally elderly, ventilator-dependent survivors of catastrophic illness, who are in continuous need of sophisticated medical interventions and treatments, often at substantial cost. Many of these patients are successfully weaned from PMV in post-ICU step-down units, regional weaning centers, long-term hospitals, and the RICU. This phenomenon, generated over the past 2 decades, has helped to define the role of post-ICU mechanical ventilation in the continuum of critical care medicine.

In a world made ever smaller by technology we can learn from experiences around the globe. We are discovering that our European and Asian colleagues have gravitated toward an approach not unlike our own, of providing specialized respiratory care, particularly weaning from PMV, in dedicated respiratory care units and facilities. The evolution of this approach on several continents suggests some intrinsic desirability, perhaps in efficacy and efficiency gain, and highlights PMV as a growing health care issue. Shared global knowledge, expertise, and collective experience will help meet the challenges that still lie ahead, in benchmarking and in the complex clinical, ethical, and economic problems posed by the population of patients "stuck on the ventilator." The recommendation that pulmonary/critical care practitioners familiarize themselves with local options available for their PMV patients and know what to expect for them, as suggested in the Evidence-Based Guidelines for Weaning and Discontinuing Ventilatory Support,[23] is appropriately reemphasized by the Italian experience reported by Ceriana et al.[15]

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