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The Sobering Reality of Outcomes When Older Adults Require Prolonged Mechanical Ventilation

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Several important trends have been changing intensive care units (ICUs) in the United States over the past several decades. The incidence of common critical illness syndromes such as severe sepsis and respiratory failure are increasing, and age is one of the most significant risk factors for these syndromes.^{1–4} Our ability to treat such syndromes and support critically ill patients has been improving, leading to improving survival. Additionally, the population in the US and other industrialized countries is aging.⁵ Because of these and other factors adults over age 64, who already account for more than half of ICU bed-days, constitute an ever-growing proportion of survivors of critical illness. While some ICU survivors may approach their pre-illness level of health and functional status, many others are burdened with persistent cognitive impairment, new and often permanent physical disability, and distressing psychological symptoms.^{6–9} For others, recovery is even further from complete; these patients require ongoing mechanical ventilation via tracheostomy or other intensive care therapies, entering a state increasingly described as chronic critical illness.¹⁰

The growing ranks of the chronically critically ill have contributed to the increasing numbers of long-term acute care hospitals, or LTACs, where ongoing inpatient care for these patients can be delivered. The most common indication for LTAC admission is respiratory failure with little or slow progress toward resolution thus requiring prolonged mechanical ventilation (PMV), often defined as the need for mechanical ventilation for 3 or more weeks.¹¹ LTAC stays for patients with PMV tend to be prolonged and costly, and such patients frequently experience multiple transitions between these hospitals, emergency departments, and acute care hospital ICUs.¹² LTAC utilization has been increasing, with the number of annual admissions and the cost to Medicare nearly tripling between 1997 and 2006.¹³ This dramatic growth in utilization has taken place in the absence of much data regarding the effectiveness of LTAC care, as long-term patient-centered outcomes among patients requiring LTAC stays have been understudied. The literature that does exist suggests that long-term survival among patients requiring PMV is poor. One study of patients of all ages requiring PMV admitted to a large, urban LTAC over the course of a

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single year demonstrated that 77% of these patients had died within one year, typically after spending the majority of their days in acute care or long-term care facilities.¹⁴ A similar study reported one-year survival of 56%, but that only 9% of patients admitted to the LTAC were alive and independent of major functional status limitations at that point.¹⁵ A multicenter study of nearly 1,500 patients with PMV cared for at one of 23 LTACs demonstrated that slightly more than 50% were successfully weaned from mechanical ventilation, and of those whose vital status was known at 1 year nearly 30% were alive.¹⁶ Nearly 70% of these patients had poor functional status at LTAC discharge, with 40% of these survivors continuing to have severe functional limitation 1 year after discharge. One of the few studies reporting long-term outcomes exclusively in patients aged 65 years and older presented analysis of Medicare beneficiaries admitted to LTACs and reported 1-year mortality exceeding 50% when considering all patients, and mortality of nearly 70% among those admitted to an LTAC for PMV.¹³ The paucity of studies reporting on important outcomes such as these and the heterogeneity of these studies are some of the challenges confronting clinicians and patients facing difficult decisions about the continuation of prolonged life-sustaining therapy.

In this issue of the *Journal of the American Geriatrics Society*, J. Dermot Frengley and colleagues report results from a retrospective cohort study representing one of the few attempts to investigate the effect of age on outcomes in PMV, a question of growing importance. They specifically investigate the association between age, the burden of chronic illness, measurements of respiratory physiology and outcomes among a cohort of 540 patients with respiratory failure requiring PMV admitted to a 120-bed LTAC in New York City.¹⁷ While they found an association between older age and a lower likelihood of successful weaning, age was no longer a significant factor in multivariable models that included predictors such as measurable respiratory system mechanics, the burden of co-morbid illness, and severity of acute illness. In other words, a 65 year-old patient and an 80 year-old patient with similar medical problems and identical respiratory muscle strength might be expected to have similar outcomes. These results provide an important reminder that age is often best considered as a modifier of the effect of disease rather than a strong independent predictor of outcomes among critically ill patients, and should not be used as the sole or dominant criterion informing decisions about the use of PMV.

Additionally, there are other findings in this work of great importance to those who counsel patients and their families regarding decisions to continue PMV. Among all the elderly patients admitted to this LTAC, only 22% were successfully weaned from mechanical ventilation (which they conservatively defined as freedom from mechanical ventilation for 4 or more weeks). Among this group 38% experienced a subsequent relapse to prolonged mechanical ventilation and only 41% were able to undergo tracheostomy decannulation, an important marker of recovery. Nearly two-thirds of the cohort did not survive to LTAC discharge. Even more remarkable is the fact that only 20 of the 540 patients (4%) were discharged home. While it is important to consider that the proportion of these patients who were living at home prior to their initial ICU admission is not presented in these data, and that the need for care in a skilled nursing facility is influenced by social and other nonmedical factors, returning home frequently is an important goal for patients and their

families. Additionally, 9% of the patients were discharged to a nursing facility, and 24% left the LTAC to return to an acute care hospital, signifying a high risk of death. Among the relatively small group successfully weaned and discharged alive, functional status was significantly worse than pre-illness levels. The mean Zubrod score of 3 in this group signifies that the average patient was capable of limited self-care, and was confined to bed or chair 50% or more of waking hours at the time of LTAC discharge. In total, among this group of patients aged 65 years and older admitted to an LTAC for PMV in this study, an astonishing 87% either died in the LTAC or were transferred from the LTAC to an acute care hospital. Thus this study not only helps to clarify how age should and should not be considered when predicting outcomes in patients with PMV admitted to an LTAC but also provides further evidence that good outcomes in these patients occur far less often than most patients would hope or even expect.¹⁵

Improved understanding of prognosis with regard to patient-centered outcomes among elderly patients with PMV such as those reported by Frengley can only impact difficult decisions about prolonged life-sustaining therapy if high-quality communication between physicians, their patients, and those patients' surrogate decision makers takes place. Unfortunately, there is evidence that such effective communication takes place infrequently. The large majority of chronically critically ill elderly patients in one study had neither designated a proxy decision-maker nor completed an advanced directive.¹⁸ Other studies demonstrate that only a small minority of chronically critically ill patients or their families report receiving information at any point during ICU stay about expected functional status and care giving needs at hospital discharge or prognosis for 1-year survival.^{15, 19} It is imperative that health care professionals who assist patients with advance care planning not only be able to discuss potential benefits and burdens of emergency interventions such as endotracheal intubation and cardiopulmonary resuscitation, but also have a sense of expected outcomes when critical illness lasts not days but weeks or months. The importance of these conversations obviously rises when a patient who is critically ill is not showing signs of improvement. Too often the decisions made after a discussion about a patient's values and preferences regarding life-sustaining therapy that took place early in the course of a life-threatening illness are 'carried forward' without re-exploration, as if respiratory failure requiring mechanical ventilation for 2 days carries the same burdens and conveys has the same likelihood of an outcome acceptable to most older patients as mechanical ventilation that has already been required for 3 weeks. It will take improved knowledge of outcomes such as those Frengley presents here to be able to improve our ability to prognosticate, but it will take high-quality, effective, and on-going communication for this knowledge to impact decisions about the continuation of life-sustaining therapies for those patients approaching chronic critical illness.

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References

1. Angus DC, Linde-Zwirble WT, Lidicker J, et al. Epidemiology of severe sepsis in the United States: analysis of incidence, outcome, and associated costs of care. *Crit Care Med*. 2001; 29:1303–1310. [PubMed: 11445675]
2. Martin GS, Mannino DM, Eaton S, et al. The epidemiology of sepsis in the United States from 1979 through 2000. *N Engl J Med*. 2003; 348:1546–1554. [PubMed: 12700374]
3. Martin GS, Mannino DM, Moss M. The effect of age on the development and outcome of adult sepsis. *Crit Care Med*. 2006; 34:15–21. [PubMed: 16374151]
4. Carson SS, Cox CE, Holmes GM, et al. The changing epidemiology of mechanical ventilation: a population-based study. *J Intensive Care Med*. 2006; 21:173–182. [PubMed: 16672639]
5. U.S. Census Bureau. Population Estimates and Projections. The Next Four Decades; The Older Population in the United States: 2010 to 2050. 2010.
6. Ehlenbach WJ, Hough CL, Crane PK, et al. Association between acute care and critical illness hospitalization and cognitive function in older adults. *Jama*. 2010; 303:763–770. [PubMed: 20179286]
7. Iwashyna TJ, Ely EW, Smith DM, et al. Long-term cognitive impairment and functional disability among survivors of severe sepsis. *JAMA*. 2010; 304:1787–1794. [PubMed: 20978258]
8. Hopkins RO, Weaver LK, Collingridge D, et al. Two-year cognitive, emotional, and quality-of-life outcomes in acute respiratory distress syndrome. *Am J Respir Crit Care Med*. 2005; 171:340–347. [PubMed: 15542793]
9. Davydow DS, Gifford JM, Desai SV, et al. Posttraumatic stress disorder in general intensive care unit survivors: a systematic review. *Gen Hosp Psychiatry*. 2008; 30:421–434. [PubMed: 18774425]
10. Nelson JE, Cox CE, Hope AA, et al. Chronic critical illness. *Am J Respir Crit Care Med*. 2010; 182:446–454. [PubMed: 20448093]
11. Eskildsen MA. Long-term acute care: A review of the literature. *J Am Geriatr Soc*. 2007; 55:775–779. [PubMed: 17493200]
12. Unroe M, Kahn JM, Carson SS, et al. One-year trajectories of care and resource utilization for recipients of prolonged mechanical ventilation: A cohort study. *Ann Intern Med*. 2010; 153:167–175. [PubMed: 20679561]
13. Kahn JM, Benson NM, Appleby D, et al. Long-term acute care hospital utilization after critical illness. *JAMA*. 2010; 303:2253–2259. [PubMed: 20530778]
14. Carson SS, Bach PB, Brzozowski L, et al. Outcomes after long-term acute care. An analysis of 133 mechanically ventilated patients. *Am J Respir Crit Care Med*. 1999; 159:1568–1573. [PubMed: 10228128]
15. Cox CE, Martinu T, Sathy SJ, et al. Expectations and outcomes of prolonged mechanical ventilation. *Crit Care Med*. 2009; 37:2888–2894. quiz 2904. [PubMed: 19770733]
16. Scheinhorn DJ, Hassenpflug MS, Votto JJ, et al. Post-ICU mechanical ventilation at 23 long-term care hospitals: A multicenter outcomes study. *Chest*. 2007; 131:85–93. [PubMed: 17218560]
17. Frengley JD, Sansone GR, Shakya K, et al. Prolonged mechanical ventilation in 540 seriously ill patients aged 65 years and older: Effects of increasing age on clinical outcomes and survival. *J Am Geriatr Soc*. 2014; 62:000–000.
18. Camhi SL, Mercado AF, Morrison RS, et al. Deciding in the dark: Advance directives and continuation of treatment in chronic critical illness. *Crit Care Med*. 2009; 37:919–925. [PubMed: 19237897]
19. Nelson JE, Mercado AF, Camhi SL, et al. Communication about chronic critical illness. *Arch Intern Med*. 2007; 167:2509–2515. [PubMed: 18071175]