

## Early Mobilization of Patients on Mechanical Ventilation: Worth the Effort and Expense?

The ventilator discontinuation process involves both disease resolution and proper support to facilitate recovery. This support includes optimizing nutrition, fluid-electrolyte balance, and infection control as well as avoiding problems such as ventilator-induced lung injury, discomfort, and unnecessary sedation. Attempts to rehabilitate respiratory muscle function compromised by systemic inflammation (ICU-acquired weakness), malpositioning of the diaphragm, excessive muscle loading, malnutrition, and disuse atrophy can probably be added to these goals. Indeed, ICU-acquired weakness has been shown in several studies to be associated with an increased duration of mechanical ventilation and with increased ICU and hospital length of stay.<sup>1</sup>

One of the approaches to muscle rehabilitation in the patient who is critically ill and mechanically ventilated is the concept of early mobility, “use it or lose it.”<sup>1</sup> Benefits of physical movement in patients who are critically ill have been known for decades and include less muscle atrophy,<sup>2</sup> more muscle strength,<sup>3</sup> more ventilator-free days,<sup>4</sup> less delirium,<sup>4</sup> shorter lengths of stay,<sup>5</sup> fewer readmissions,<sup>6</sup> and even reduced mortality.<sup>5</sup> Most of these studies used formal protocols that advanced mobility in stages from simple passive range of motion to assisted walking, depending on patient capabilities. Taken together, these studies provide substantial evidence that protocols for early mobilization are both possible and safe, and are often associated with important outcome benefits.

In this issue of *RESPIRATORY CARE*, an observational study by Schreiber et al<sup>7</sup> adds to this evidence. This particular study focused on subjects dependent on prolonged mechanical ventilation who were transferred from an acute care ICU to their long-term weaning unit. Importantly, this unit had a dedicated team that provided intense physiotherapy and used a formal protocol that moved subjects through 4 stages of activity and mobility.<sup>7</sup> The investigators reported successful ventilator withdrawal in 62.3% of these subjects on prolonged mechanical ventilation, a figure comparable with other reports that used early mo-

bility protocols in acute-care ICUs. Not surprisingly, successful ventilator withdrawal was strongly associated with the ability to mobilize subjects. Because there was no

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control group, it is difficult to determine the specific effect of the physiotherapy protocol. Nevertheless, the results supported the notion that improved mobility is associated with improved ventilator withdrawal.

So, should early mobility be a routine procedure for mechanically ventilated patients? The above supporting studies seem strong but are unblinded by necessity, and this creates potential for bias. Indeed, some have suggested that at least some of the benefits attributed to early mobility programs are really a consequence of an aggressive sedation management program, a strategy well documented to facilitate ventilator withdrawal. Early mobilization protocols also carry potential risks, the most common of which is arterial hemoglobin desaturation.<sup>8,9</sup> Fortunately these risks are quite rare and are usually easily managed. However, patient selection and monitoring are critically important, and these must be performed by personnel trained to know how to respond. Recent guidelines have been published to address these issues, and they provide valuable resources to clinicians involved in these programs.<sup>10,11</sup> Finally, these programs incur costs for the extra personnel and equipment provided, and hospital administrators must buy in to these additional resources to allow these programs to exist.

In weighing the strength of the supporting evidence against potential downsides, it would seem that, at the present time, formalized, protocol-driven early mobilization programs provided by experienced clinicians are reasonable and have the potential to significantly improve long-term outcomes for patients on mechanical ventilation.<sup>12</sup> The most cost-effective way to do this requires further study.

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Dr MacIntyre discloses relationships with Ventec, Breathe, and InspiRx.

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**Neil R MacIntyre**  
Duke University Medical Center  
Durham, North Carolina

## REFERENCES

1. Truong AD, Fan E, Brower RG, Needham DM. Bench-to bedside review: mobilizing patients in the intensive care unit—from pathophysiology to clinical trials. *Crit Care* 2009;13(4):216.
2. Griffiths RD, Palmer TE, Helliwell T, MacLennan P, MacMillan RR. Effect of passive stretching on the wasting of muscle in the critically ill. *Nutrition* 1995;11(5):428-432.
3. Team Study Investigators, Hodgson C, Bellomo R, Berney S, Bailey M, Buhr H, et al. Early mobilization and recovery in mechanically ventilated patients in the ICU: a bi-national, multi-centre, prospective cohort study. *Crit Care* 2015;19:81.
4. Schweickert WD, Pohlman MC, Pohlman AS, Nigos C, Pawlik AJ, Esbrook CL, et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. *Lancet* 2009;373(9678):1874-1882.
5. Morris PE, Goad A, Thompson C, Taylor K, Harry B, Passmore L, et al. Early intensive care unit mobility therapy in the treatment of acute respiratory failure. *Crit Care Med* 2008;36(8):2238-2243.
6. Morris PE, Griffin L, Berry M, Thompson C, Hite RD, Winkelman C, et al. Receiving early mobility during an intensive care unit admission is a predictor of improved outcomes in acute respiratory failure. *The American journal of the Medical Sciences* 2011;341(5):373-377.
7. Schreiber AF, Ceriana P, Ambrosino N, Malovini A, Nava S. Physiotherapy and weaning from prolonged mechanical ventilation. *Respir Care* 2019;64(1):17-25.
8. Adler J, Malone D. Early mobilization in the intensive care unit: a systematic review. *Cardiopulm Phys Ther J* 2012;23(1):5-13.
9. Sricharoenchai T, Parker AM, Zanni JM, Nelliot A, Dinglas VD, Needham DM. Safety of physical therapy interventions in critically ill patients: a single-center prospective evaluation of 1110 intensive care unit admissions. *Journal of Critical Care* 2014;29(3):395-400.
10. Hodgson CL, Stiller K, Needham DM, Tipping CJ, Harrold M, Baldwin CE, et al. Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults. *Critical Care* 2014;18(6):658-663.
11. Bourdin G, Barbier J, Burle JF, Durante G, Passant S, Vincent B, et al. The feasibility of early physical activity in intensive care unit patients: a prospective observational one-center study. *Respir Care* 2010;55(4):400-407.
12. Schmidt UH, Knecht L, MacIntyre NR. Should early mobilization be routine in mechanically ventilated patients? *Respir Care* 2016;61(6):867-875.