

In Our Unit

Just Keep MOVEN: An Evidence-Based Approach to Improving Outcomes in Patients Receiving Mechanical Ventilation

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Immobility is a major risk factor for many complications related to being in an intensive care unit (ICU). Approximately 40% or more of muscle strength can be lost in the first week of being immobilized.¹ Immobility and functional decline are associated with an increased risk of delirium, pneumonia, prolonged mechanical ventilation, pressure injuries, deep vein thrombosis, increased cardiac workload, reduction of cardiac output, decreased orthostatic tolerance, and increased production of proinflammatory cytokines.^{1,2}

Mobilizing patients who are receiving mechanical ventilation has been shown to be safe and effective in decreasing morbidity and mortality.³⁻⁵ Studies have demonstrated that routinely mobilizing these patients can reduce ventilator-associated events such as pneumonia, reduce the duration of ventilation, and reduce ICU and hospital length of stay.¹⁻⁸ Despite the common perception of a risk of harm to the patient, a systematic review indicated that mobilizing patients in the ICU who were undergoing mechanical ventilation was associated with only a 2.6% incidence of adverse effects, with only 0.6% requiring medical intervention.³ Nurses can improve outcomes for patients receiving mechanical ventilation by implementing an early progressive mobility protocol.

Problem Identification

Penn Presbyterian Medical Center (PPMC) is a 365-bed, Magnet-designated, level I trauma center in Philadelphia, Pennsylvania. The heart and vascular ICU (HVICU) at PPMC is a 20-bed unit that provides care to critically ill adult medical and surgical cardiac patients. It serves a high-acuity patient population, with many requiring advanced mechanical circulatory support such as venovenous or venoarterial extracorporeal membrane oxygenation (ECMO), a ventricular assist device, the Impella

device (Abiomed), an intra-aortic balloon pump, or continuous renal replacement therapy. Because of the complex nature of these patients' conditions, many of the patients were perceived by staff members as being too hemodynamically unstable to be mobilized. Random medical record audits of patients in the HVICU who were receiving mechanical ventilation revealed that only 6% of these patients per day were being mobilized out of bed. Through participation in the American Association of Critical-Care Nurses (AACN) Clinical Scene Investigators (CSI) Academy, a group of 4 nurses identified mobility as an area of opportunity to improve patients' outcomes and set out to implement a standardized protocol for mobilizing patients receiving mechanical ventilation.

Purpose and Goals of the Project

The purpose of this project was to increase the mobility of patients in the HVICU who were receiving mechanical ventilation by creating a standardized protocol. A literature review was conducted, and the AACN early progressive mobility protocol was adopted to guide safety screening and the implementation of progressive mobility interventions (Figure 1).⁶ The goals set for the project were as follows:

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Early Progressive Mobility Protocol

STEP 1: Screen for Safety

Evaluate daily

M Myocardial Stability

- No active cardiac ischemia within past 12-24 h
- No dysrhythmia requiring new antidysrhythmic agent within past 12-24 h

O Oxygenation Stability

- $F_{iO_2} < 0.85$ on mechanical ventilation
- PEEP < 15 cm H_2O
- No unsecured airway

V Vasopressor Use

- No new or increase of any vasopressor for 2 h

E Engages to Voice

- Responds to verbal stimulation
- RASS $< +3$, or SAS < 6

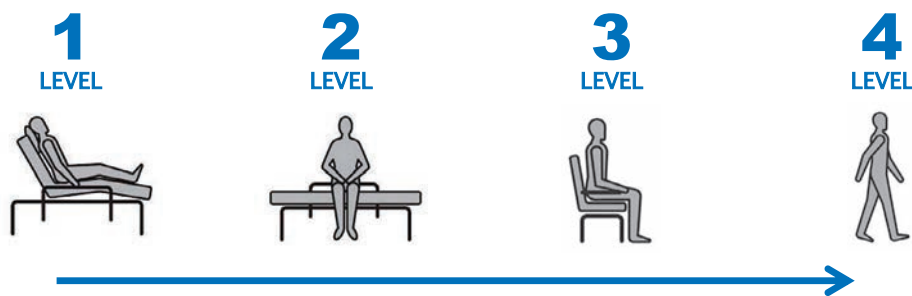
N Neuro Stability

- ICP < 15
- No acute or uncontrolled intracranial event

Does not meet criteria = Start at Level 1 and evaluate in 12 h

Meets all criteria = Start at Level 2 and progress

STEP 2: Implement Progressive Mobility



Goal: Clinical stability and able to move arm against gravity

- Passive ROM 3 times a day
- Turn every 2 h
- Active-resistance PT
- Sitting position 20 min 3 times a day

Goal: Sitting upright and able to move leg against gravity

- Passive ROM 3 times a day
- Turn every 2 h
- Active-resistance PT
- Sitting position 20 min 3 times a day
- Sitting on edge of bed

Goal: Increased strength and stands with minimal to moderate assistance

- Turn every 2 h
- Active-resistance PT
- Sitting position 20 min 3 times a day
- Sitting on edge of bed
- Active transfer to chair ≥ 20 min 2 times a day

Goal: Strength and distance walk

- Self- or assisted turn every 2 h
- Active-resistance PT
- Active transfer to chair ≥ 20 min 3 times a day
- Ambulation (marching in place, walking in halls)

Figure 1 Early progressive mobility protocol.

Abbreviations: F_{iO_2} , fraction of inspired oxygen; ICP, intracranial pressure; PEEP, positive end-expiratory pressure; PT, physical therapy; RASS, Richmond Agitation-Sedation Scale; ROM, range of motion; SAS, Sedation-Agitation Scale.

Adapted with permission from the American Association of Critical-Care Nurses.⁶

- 25% increase in registered nurse documentation of mobility of patients receiving mechanical ventilation per day
- 75% increase in achievement of mobility levels out of bed by patients receiving mechanical ventilation
- 10% decrease in HVICU ventilator days per month
- 10% decrease in HVICU length of stay for patients receiving mechanical ventilation

Action Plan

The CSI team started by conducting a survey of the staff to identify what they perceived as barriers to mobilizing patients receiving mechanical ventilation. The top 3 barriers identified were hemodynamic instability, lack of time, and lack of personnel or support staff. The team sought to address these barriers by using a standardized screening tool to easily identify which patients were safe to mobilize, educating interdisciplinary staff members on the safety and benefits of mobility, and adopting a “mobility champion shift” in which a mobility champion, either a nurse or a certified nurse aide (CNA), would be present on the unit for a few hours during the day to assist with mobility.

Baseline data for ICU length of stay and ventilator days were obtained for the 12 months before project kickoff. The group conducted random medical record audits of patients in the HVICU who were receiving mechanical ventilation to obtain baseline data for mobility levels achieved and registered nurse documentation. Because the mobility protocol safety screening process spelled

out the acronym “MOVEN,” the slogan “Just Keep MOVEN” and a fish logo were adopted to promote the project.

Before launching the project, the CSI team educated staff members one-on-one and at shift huddle with nurses, CNAs, advanced practice providers, physicians, respiratory therapists, physical therapists (PTs), and occupational therapists (OTs). To promote buy-in from key stakeholders, the project was also presented at multiple leadership meetings. Providers were encouraged to include a mobility goal as part of discussion in daily rounds.

On the week of kickoff, lunch was provided for day shift and night shift staff members as another opportunity for education and to promote the project. Treats and “badge buddies” with the mobility protocol tool printed on them were handed out to staff members. Mobility champions were given T-shirts with the logo and slogan to be worn during mobility shifts so that staff members could easily identify the mobility champion for the day. Laminated copies of the mobility protocol were displayed on every patient’s door, and there was a designated place on the whiteboards to write each patient’s mobility goal for the day. Mobility champions and bedside nurses worked closely with PTs, OTs, respiratory therapists, and perfusionists, if necessary, to mobilize patients receiving mechanical ventilation who were deemed appropriate according to the safety screening protocol.

After the first few weeks, the CSI team, in discussion with mobility champions and PTs and OTs, perceived a need to demonstrate safe practices for mobilizing

these patients to all members of the nursing staff. A group of PTs and OTs hosted a workshop on mobilization techniques designed to ensure the safety of both staff members and patients. A slideshow with videos was sent to all staff members for the benefit of anyone who could not attend the workshop.

After a few more weeks, a “master mover” incentive program was initiated to continue promoting the project and to keep staff members motivated. Champions would nominate a nurse or CNA who was especially proactive in mobilizing their patients to be named “master mover,” who received either a tumbler or a fleece blanket with the PPMC logo. Their photograph was displayed on a bulletin board on the unit that was decorated with the fish logo and slogan and the MOVEN acronym.

Results

Postintervention data were collected over a 6-month period. The data showed that patients receiving mechanical ventilation were consistently reaching much higher mobility levels in the postintervention period compared with the preintervention period (Figure 2). The rate at which these patients got out of bed per day increased from 6% before the intervention (August 2020 to August 2021) to 40% after the intervention (August 2021 to January 2022). Nurses were documenting mobility an average of 2.59 times per day after implementation of the intervention, compared with 1.98 times per day before implementation, representing a 31% increase. Moreover, the ICU length of stay for patients receiving mechanical ventilation decreased by 12%.

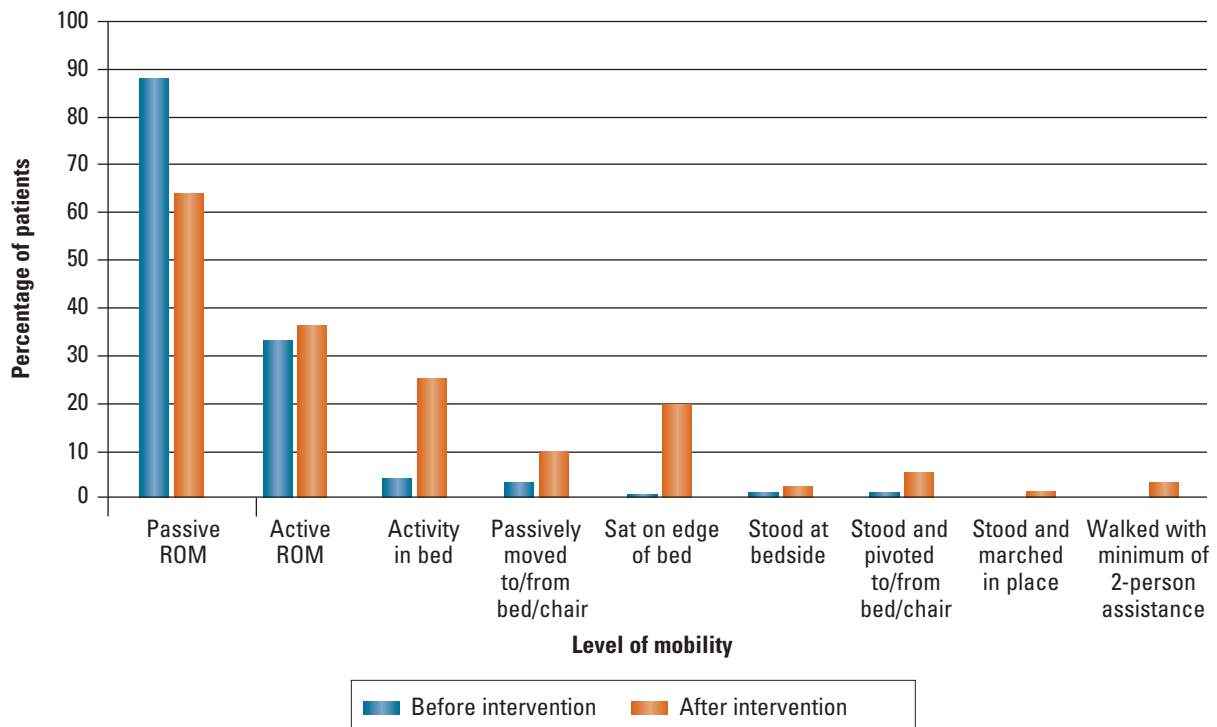


Figure 2 Mobility levels achieved per day before (August 2020-August 2021) and after (August 2021-January 2022) the intervention in patients receiving mechanical ventilation in the heart and vascular intensive care unit, based on nurse documentation.

Abbreviation: ROM, range of motion.

In contrast, there was a slight increase in average number of ventilator days per month during the intervention period, from 282.1 days to 298.7 days. The CSI team speculated that because the intervention period also coincided with a COVID-19 surge, the increase could be attributed to an overall increase in the number of patients needing mechanical ventilation who were admitted to the unit.

Clinical Implications

The CSI Academy is designed to support and empower bedside nurses to become leaders who can create lasting change, influence unit culture, and improve patients' outcomes. It also serves to facilitate collaboration across different units and

hospitals so that ideas can be shared between clinicians and best practices can be replicated in other facilities. Because of the success of the mobility project in the HVICU, other units in the hospital have expressed interest in implementing similar mobility protocols. During this project, an early mobility protocol for ECMO patients was also developed. This protocol helped patients qualify for lung transplant on the basis of their functional status and improved the functional status of patients being weaned from ECMO.

One unexpected outcome of the current project was improved unit morale. Implementing this project after experiencing tremendous loss and grief during the COVID-19 pandemic allowed staff members

to feel empowered to make a positive difference in patients' outcomes. Collaborating with PTs and OTs to set goals for patients and seeing patients reach those goals was fulfilling and rewarding. [CCN](#)

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References

1. Dirkes SM, Kozlowski C. Early mobility in the intensive care unit: evidence, barriers, and future directions. *Crit Care Nurse*. 2019; 39(3):33-42.
2. Wu X, Li Z, Cao J, et al. The association between major complications of immobility

during hospitalization and quality of life among bedridden patients: a 3 month prospective multi-center study. *PLoS One*. 2018; 13(10):e0205729. doi:10.1371/journal.pone.0205729

3. Nydahl P, Sricharoenchai T, Chandra S, et al. Safety of patient mobilization and rehabilitation in the intensive care unit: systematic review with meta-analysis. *Ann Am Thorac Soc*. 2017;14(5):766-777.
4. Castro E, Turcinovic M, Platz J, Law I. Early mobilization: changing the mindset. *Crit Care Nurse*. 2015;35(4):e1-e5. doi:10.4037/ccn2015512
5. Hodgson C, Stiller K, Needham DM, et al. Expert consensus and recommendations on safety criteria for active mobilization of mechanically ventilated critically ill adults. *Crit Care*. 2014;18(6):658.
6. Schallom M, Tymkew H, Vyers K, et al. Implementation of an interdisciplinary AACN early mobility protocol. *Crit Care Nurse*. 2020;40(4):e7-e17. doi:10.4037/ccn2020632
7. Raouf S, Baumann MH. Ventilator-associated events: the new definition. *Am J Crit Care*. 2014;23(1):7-9.
8. Morris PE, Goad A, Thompson C, et al. Early intensive care unit mobility therapy in the treatment of acute respiratory failure. *Crit Care Med*. 2008;36(8):2238-2243.

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