

Understanding early goal-directed mobilization in the surgical intensive care unit

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As the population ages and the mortality associated with critical illness is decreasing, there is a growing population of intensive care unit (ICU) survivors who frequently experience long-lasting impairments in physical, cognitive and mental health, commonly referred to as the “Post-Intensive Care Syndrome (PICS)” (1). In particular, muscle weakness is common (2-4), and is associated with worse patient outcomes (5-8). Prolonged bedrest can contribute to such “ICU-acquired weakness” (9), and there is a growing body of literature demonstrating that early mobilization and physical rehabilitation in the ICU can improve muscle weakness, physical functioning, and quality of life in ICU survivors (10-14). There are very few studies (11) specifically evaluating early mobilization in surgical intensive care unit (SICU) patients. There are multiple perceived barriers to early mobilization and rehabilitation in the SICU, including concerns related to pain, wound dehiscence, dislodgement of drains and other medical devices, as well as limitations in staffing, time and resources (15). A new, international multi-centered randomized trial (16) evaluating the efficacy and safety of early mobilization and rehabilitation in SICU patients adds to the existing literature supporting this intervention in ICU patients.

This new study (16) was conducted from July 2011 to November 2015 in SICUs located in five hospitals in Austria, Germany and the United States. Patients were enrolled within 48 hours of initiation of mechanical

ventilation and were functionally independent prior to hospital admission. The intervention group (N=104) had a daily SICU Optimal Mobilization Score (SOMS) goal set by the ICU team and a facilitator (i.e., a physical therapist, nurse, or a medical doctor, depending on study site) who worked with the team to help overcome barriers to achieving the SOMS goal. The control group (N=96) received “usual care” for their mobilization/rehabilitation.

Study results demonstrated that all patients were generally alert and received a modest total duration of physical therapy (PT) interventions in the ICU [mean (SD) Richmond Agitation-Sedation Scale (RASS) score -0.7 (0.1) *vs.* -0.8 (0.1) and median (IQR) total duration of PT 60 (0-110) min *vs.* 48 (20-128) minutes, respectively]. The mean (SD) SOMS achieved during the ICU stay was significantly higher in the intervention *vs.* control group [2.2 (1.0) *vs.* 1.5 (0.8), $P<0.0001$], with a greater proportion of patients in the intervention group able to walk at ICU discharge (52% *vs.* 25%), functionally independent at hospital discharge (51% *vs.* 28%, $P<0.003$), and discharged to home (51% *vs.* 27%, $P<0.0007$). Patients in the intervention *vs.* control group also had decreased median (IQR) SICU length of stay (LOS) [7 (5-12) *vs.* 10 (6-15) days, $P=0.0054$] and increased delirium-free days [25 (16-27) *vs.* 22 (15-25) days, $P=0.016$]. There were no serious adverse events during mobilization activities in either group. Quality of life, measured using the 36-item Short

Form Survey (SF-36) at 3 months after hospital discharge, was similar between the two groups, albeit with 38% loss to follow-up.

Discussion

This RCT is a novel and important evaluation of an early mobilization intervention in SICU patients. There are a number of noteworthy points to emphasize. Interestingly, the study formally included a facilitator role in design of the intervention. This facilitator was part of the SICU clinical team and used closed loop communication with the entire patient care team to overcome barriers to achieving the daily SOMS goal. This aspect of the intervention likely helped address a lack of coordination among team members that is a commonly reported barrier to mobilization in the ICU (15). Moreover, the total physical therapy time was only modestly higher in the intervention vs. usual care group, with the SICU nurses actively involved in the mobilization activities (17).

Patients in the intervention group started mobilization early in their ICU stay, i.e., no later than 72 hours after initiation of mechanical ventilation. Similarly, in an RCT in which 104 MICU patients were randomized to usual care *vs.* early rehabilitation starting within 72 hours of mechanical ventilation, a greater proportion of patients in the intervention group also returned to independent functional status at hospital discharge, with a median ICU LOS that was two days less (18). Hence, the improvement in mobility and LOS demonstrated in SICU patients in this trial adds to the existing literature in MICU patients, emphasizing the importance of early onset of mobilization and rehabilitation after the start of mechanical ventilation.

In the intervention group in this RCT, a daily SOMS goal was established during morning rounds, and a sign with this goal was posted at the bedside. This approach has some similarity to a recent multi-centered pilot RCT of 50 patients from five mixed medical-surgical ICUs in Australia and New Zealand that evaluated an early goal-directed mobilization program *vs.* usual care. This pilot RCT demonstrated that a greater proportion of patients in the intervention group were able to stand or walk in the ICU (19). These findings emphasize the importance of not only early, but also goal-directed, mobilization, to achieve higher levels of mobility in ICU patients.

Importantly, patients in both the intervention and usual care groups had a high level of wakefulness which is important for successful implementation of early

mobilization, as demonstrated in prior studies (18,20,21). Moreover, this similar sedation status in both groups suggests that the difference in delirium-free days between the groups may be attributed to early mobilization, rather than sedation management alone, as demonstrated previously (18).

In this trial, 38% of participants were lost to follow up at 3 months, limiting the conclusions that can be drawn regarding the effect of the intervention on post-discharge quality of life status. Participant retention is important in studies aiming to evaluate the long-term outcomes of ICU survivors, with increasing interest in the development of tools and strategies to maximize cohort retention (for instance, see The Improving Long-Term Outcomes Research for Acute Respiratory Failure Study: www.improvelto.com).

Conclusions

This new RCT has provided an important contribution to the existing literature, demonstrating that early, goal-directed mobilization is feasible and safe in SICU patients, and associated with increased mobility and functional independence, greater discharge to home, and reduced length of stay. The use of a facilitator for patient mobility, setting a mobility goal using a pre-established mobility scale, active involvement by nurses, and wakefulness in these mechanically ventilated patients are important lessons for clinical practice and future research in the field.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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