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Get out of bed: Immobility in the Neuro ICU

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Patients admitted to the Neurological intensive care unit (Neuro ICU) face a myriad of difficulties including a high risk of death and severe physical and cognitive impairments. Clinical treatment decisions often have to be made at a time when prognosis is uncertain. Admitted with stroke, head trauma or other severe acute brain injury, these patients are typically immobilized by their illness alone. Add to that intracerebral lines and monitoring devices, bedrest may at first seem not only necessary but also inevitable. The consequences, however, of prolonged immobility are detrimental [1, 2].

Even among critically ill patients without acute brain injury, ICU-acquired weakness is common. At least 25% of patients receiving one week or more of mechanical ventilation develop such significant weakness that they are unable to lift their limbs against gravity [2]. In patients with high severity of illness, such as the acute respiratory distress syndrome, ICU-acquired weakness may be even more common, and persists at hospital discharge [3]. ICU-acquired weakness is associated with poorer hospital outcomes, including death [4, 5], prolonged mechanical ventilation [2], recurrent respiratory failure [6], and delays recovery and return home [2, 7]. Longer term outcomes, such as health-related quality of life and functional status at 12 months, are also adversely affected by ICU-acquired weakness [3].

Patients with ICU-acquired weakness have muscle atrophy and additional pathologic changes of muscle and nerve that are referred to as critical illness myopathy and neuropathy [2, 8, 9]. The most consistent risk factor appears to be severe systemic inflammatory response syndrome and shock [8, 10]. While most risk factors for ICU-acquired weakness may be unavoidable, including age, gender and severity of illness [2], prolonged immobility is a compelling risk factor that can be avoided [3]. Immobility is a known contributor to muscle atrophy, but in the setting of critical illness, immobility increases local and systemic inflammation and escalates the pathogenesis of critical illness neuropathy and myopathy [11]. When patients with severe acute brain injury develop ICU-acquired weakness, physicians' prognosis becomes overly pessimistic [12]. With prognostic pessimism already

so prevalent after severe stroke, especially intraparenchymal hemorrhage [13, 14], the importance of avoiding ICU-acquired weakness can therefore not be overstated.

Stroke remains the leading cause of serious, long-term disability in the US, and the number of stroke survivors will continue to increase. In 2010, the total costs for stroke and traumatic brain injury in the US were estimated to be over \$35 and \$75 billion, respectively, with severe injuries accounting for the majority of these costs [15, 16]. Finding a treatment for our severe acute brain injury patients that would shorten their hospital stay as well as their need for post-hospital institutionalization would save costs and improve quality of life.

Early mobility has been shown to improve functional recovery of both the body and brain, with promotion of ambulation, functional independence at hospital discharge, and significant reduction in duration of delirium [17]. Indeed, getting patients out of bed seems to be a potent approach to reducing the negative sequelae of critical illness.

In their article “Clinical and Psychological Effects of Early Mobilization in Patients Treated in a Neurological ICU: A Comparative Study” in this week’s Critical Care Medicine, Kate Klein and colleagues introduce an early mobility program to a large Neuro ICU that is created and led by the unit’s nurses. Using a prospective, pre-post-intervention design, the study findings suggest significantly higher mobility levels, lower hospital and ICU length of stay, and a higher likelihood of being discharged home in those patients receiving the early mobility program [18]. Despite the non-randomized design that limits causal inference, this study is an important addition to the (neuro)critical care literature and shows that early mobilization is not only feasible: it can be a standard part of the nurses’ ICU routine, with the help of a lift team as well as the typical rehabilitation program provided by physical and occupational therapists. This study is a real-world application of previous RCTs [17] that gives a practical approach on how to mobilize Neuro ICU patients early, thereby not only improving their mobility but also increasing their chances of doing what every Neuro ICU patient wants most: to go home.

As treatments in our intensive care units are becoming more complex and high-tech, this timely study confirms an often forgotten lore: Exercise is the best medicine – even in the Neuro ICU.

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