

ABCDEs of ICU Early Mobility

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The intensive care unit (ICU) provides a critical level of care to medically unstable patients. Patients need intensive monitoring and treatment that may require emergency interventions. The vulnerability and complexity of the ICU unintentionally creates an environment that limits and poorly defines the intervention of early mobility in the unstable critically ill patients. The short- and long-term effects of immobility and bed rest increase acute complications, the length of stay in the ICU and hospital, and mortality and morbidity rates. According to current research, instituting early mobility programs can improve patient outcomes. Current research has demonstrated the safety and feasibility of the initiation of early mobility programs in the critically ill. The benefits to patients enhance recovery of functional exercise capacity, weaning outcomes, self-perceived functional status, and muscle force and strength. Consequently, patient's length of stay in the ICU and in hospital decreases and improves health outcomes. The scope of practice for nurses and other health care providers should guide by evidenced-based research to reduce complications and enhance patient outcomes. Further research is necessary to establish and institute policies and protocols on early mobility programs in the ICU to direct patient care. The role of the clinical nurse specialist can contribute by conducting evidence-based research, educating health care providers and patients, and implementing protocols. The hope is to change the culture of the ICU for the better. **Key words:** *early mobility, functional denervation, independent functional status, interdisciplinary model, interdisciplinary team, muscle atrophy, mobility protocol, neuromuscular weakness*

THE intensive care unit (ICU) is known to care for critically ill patients. The hemodynamic instability of ICU patients creates a culture of vulnerability and cautiousness when implementing patient care. The cautious approach to ICU patients can negatively affect the short- and long-term benefits of patient outcomes.

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NURSING INTERVENTION ANALYSIS

Description of early mobility

Early mobility intervention is not solely a focus on achieving prehospital ambulation status. Rather it is the initiation of a mobility program when the patient is minimally able to participate with therapy, hemodynamically stable, and receiving acceptable levels of oxygen. A mobility program sets parameters on initiation of early mobility, the duration according to the patient's stability, and the proposed outcomes. Initiation of a mobility program requires an interdisciplinary model and team to ensure and optimize safety, timing, and duration. Each member of the interdisciplinary team is vital in successfully implementing the intervention.¹ The physician is responsible for making medical decisions. The respiratory, physical, and occupational therapists evaluate the patient's progress and assist

in implementing the intervention. The registered nurse participates in implementing the intervention but also discusses the current medical status and proposed plan of care with the physician and therapists.

The other essential member of the interdisciplinary team is the advanced practice nurse (APN) who brings together the medical and nursing scope of practice with the intention to improve patient outcomes.

Importance to patient outcomes

Early mobility intervention has significance because of the influence on patient outcomes. The absence of early mobility leads to neuromuscular weakness because of prolonged immobility. The etiology of neuromuscular weakness is multifactorial and includes disuse atrophy, decrease in strength, and functional denervation. Continual bed rest can lead to decrease strength of antigravity muscles such as the back and calf muscles leading to disuse atrophy. One week of bed rest decreases muscle strength by 20%.² Functional denervation occurs when there is a decrease in frequency and intensity of nerve impulses to the muscle membrane consequently weakening muscles. Although passive range of motion is better than inactivity in bed rest, research suggests high-intensity exercises done in bed do not counteract the adverse effects of bed rest such as muscle weakness. Even an upright position helps maintain an optimal fluid distribution in the body and therefore improves orthostatic tolerance. Not implementing early mobility, patients lose hemodynamic stability and perpetuate the prolonging of early mobility initiation. The physical consequences of bed rest emphasize the importance of initiating an early mobility program to improve patient outcomes.^{1,3}

Studies have reported that 60% of intensive care patients experience continued muscular dysfunction up to 1 year after discharge because of the adverse effects of weakness and majority are unable to return to work.⁴ Another practical observation of early mobility programs is the reduced costs to the patient and the intensive care and hospital length of

stay. The long term results of early mobility program reveal an overall improvement in the patient's physical function and quality of life. Not only is a quality of life better, but an early mobility program also suggests a decrease in morbidity and mortality.¹ Patients who require ventilation more than 1 week will require 20 additional days of mechanical ventilation because of intensive care-acquired weakness. The mortality rate for patients who do not require mechanical ventilation is 19%; for those who are mechanically ventilated, the rate is 48%.^{3,5,6}

Importance to nursing and advanced practice nursing

By implementing early mobility, the registered nurse (RN) delivers therapeutic interventions centered on the patient's needs. The RN can emphasize the importance of screening patients after intensive care admission and maximize the recognition of eligible patients who are able to begin early mobility by stratifying acuity based on severity of illness and safety. Practicing evidence-based interventions also instills more confidence and trust in the health care profession—not only the patient but also to the family. The nursing scope of practice has a holistic approach and it distinguishes itself from the medical scope of practice. Because it is patient centered, achieving greater patient care and better patient outcomes is important to implement early mobility programs.

The APN agrees with the importance of early mobility from not only the nursing perspective but also the medical perspective. Utilizing many roles of the clinical nurse specialist (CNS) can promote more research studies for greater substantial evidence-based practices regarding early mobility. The CNS also can utilize their role as an educator by informing nursing staff, patients and families, and physicians the importance of evidence-based practices, the benefit of initiating early mobility, and the expectations of practices in the ICU. The CNS can expand their influence by changing current policies and establishing and implementing a standard protocol. In

order for the CNS to educate and conduct system changes, the CNS has an important responsibility to continue further research studies regarding early mobility in the ICU. Consequently, the culture of the ICU will change to promote better patient outcomes.

CURRENT EARLY MOBILITY PRACTICES IN THE INTENSIVE CARE UNIT

In Central Texas there are a number of acute care hospitals. One organization in particular focuses on establishing specific hospitals within their system to be licensed and certified with specialty such as rehabilitation and another for cardiac and stroke. However, the remaining hospitals that are not specialized have yet to implement a standard protocol about early mobility and ambulation in their ICU. According to employees working at one of the hospitals, the initiation of early mobility is ordered according to the physician's discretion and often responsibility falls on physical therapy to assess and evaluate patient-specific treatment. According to the National Guidelines Clearinghouse, the ICU lacks a national standard protocol to initiate early mobility programs. As of yet, there is limited understanding and development of early mobility programs as evidence by the lack of research and current practices in local and national hospitals.

THEORETICAL BASIS FOR EARLY MOBILITY

It is a common knowledge that immobility and bed rest leads to physiological complications such as muscle atrophy, muscle weakness, loss of bone mass, increased risk for blood clots, increased risk for skin and pressure ulcers, and decrease in functional denervation. The lack of early mobility initiation in the ICU is a strong predictor of patient outcomes.

More specific to the ICU, early mobility is impacted by the use of sedatives, narcotics, and/or paralytic agents. Use and choice of the pharmacological interventions can inhibit the

initiation of early mobility by increase profound weakness, prolong the duration of mechanical ventilation, assessment accuracy of the patient's ability to engage in mobility, and prolong the intensive care and hospital length of stay.

CURRENT SCIENTIFIC EVIDENCE

Although there are few published research regarding early mobility in the ICU, what is available suggests that early mobilization is safe and feasible, and it results in shorter intensive care and hospital length of stay, enhances recovery of functional exercise capacity and perceived functional status, increases muscle strength and force, and mitigates physiological and cognitive complications resulting in better patient outcomes.

A prospective cohort study compared 165 patients in the ICU who received physical therapy according to a mobility protocol with 165 patients who received usual care. Every patient required mechanical ventilation because of acute respiratory failure. The purpose was to determine whether a mobility protocol increased the proportion of patients who received physical therapy. The mobility protocol was initiated within 48 hours of being mechanically ventilated by the mobility team involving the critical care nurse, nursing assistant, and physical therapist. Eighty percent of patients who received physical therapy according to the mobility protocol received at least 1 physical therapy session compared with 47% of those who received usual care. Those who received physical therapy were out of bed within 5 days compared to 11 days in case of those who receives usual care. Initiation of physical therapy began in 91% of physical therapy patients compared with 13% of usual care. The results also suggest a decrease in the length of stay in the intensive care and hospital. The study concluded that the initiation of a mobility protocol was feasible and safe, did not increase cost, and was associated with decrease in length of stay.^{4,7} It also suggests the influence of a standardized protocol.

Another study focused on the functional status of patients. The purpose was to investigate whether daily exercise session using a bedside cycle ergometer was safe, effective in preventing or attenuating the decrease in functional exercise capacity and status, and quadriceps force. The randomized controlled trial examined 99 intensive care patients as soon as their cardiorespiratory condition allowed bedside cycling. The parameters began from 5 days given the patient would be staying for at least 7 more days. Both groups received the necessary respiratory physiotherapy and daily-standardized passive or active motion session. The treatment group included 20-minute sessions using a bedside ergometer daily. The results were determined by using a short-form 36 health survey questionnaire and a 6-minute walk measured at hospital discharge. The study concluded that early exercise training enhanced recovery of functional exercise capacity, self-perceived functional status, and muscle and quadriceps force at hospital discharge.⁸

A retrospective analysis of 49 consecutive patients from a multidisciplinary ventilator rehabilitation unit in an academic medical center was examined. The subjects were around 58 years of age with multiple etiologies for respiratory failure. On admission to the ICU, the subject was bedridden and had severe upper and lower weakness. The purpose of the retrospective analysis was to determine functional status of patients who are mechanically ventilated. Using a 5-point muscle strength score and a 7-point functional independent measurement, the results demonstrated an increased upper and lower strength in patients and ability to stand and ambulate in response to aggressive whole body and respiratory muscle training. *Independent functional status* is defined as the ability to perform 6 activities of daily living and the ability to walk independently with unspecified measurements.⁵ The study concluded that upper strength on admission was inversely correlated with time to wean off the mechanical ventilator and significantly improved with whole body and respiratory muscle training.

The majorities of patients in the ICU are mechanically ventilated and consequently are pharmacologically sedated. A randomized and blinded controlled trial at 2 university hospitals assessed the efficacy of combining daily interruption of sedation with physical and occupational therapy on functional outcomes in patients receiving mechanical ventilation. A total of 104 sedated adults who had been mechanically ventilated for at least 72 hours and were expected to continue for at least 24 hours were observed. The intervention focused on an early exercise and mobilization during periods of daily interruption of sedation. The results demonstrated that 59% of the intervention group returned to independent functional status compared to 35% of the control group who did not have an early exercise and mobilization program implemented. Another concern of the intensive care is the risk for delirium related to illness complications, stressful environment, and pharmacological agents. One of the results of the study demonstrated a shorter duration of delirium in patients who received an early exercise and mobilization program of 2 days versus 2 days and also achieved more ventilator-free days of 23.5 compared to 21.1 of usual care.⁹

RECOMMENDATIONS AND IMPLICATIONS

Perceived barriers to early mobility

For an early mobility program to be established in the ICU, barriers to implementation need to be addressed. Barriers include safety concerns, multiplicity of vascular access, perceived excess cost, obesity, time constraints, and reliance on other disciplines. Nursing and medical interventions are centered on the patient's safety and well-being especially in the vulnerable population of intensive care patients. The multiplicity of vascular access in patients is often seen as a barrier to patient's safety when implementing mobility. Excess lines, tubes, and drains increase the risk of falls and complicate the ease of assisting the patient out of the bed. Implementing

daily sedation interruptions and independent breathing trial from the mechanical ventilator addresses the barrier.

Another perceived barrier is the time constraint of implementing early mobility. In relation to the multiple vascular accesses, the amount of time to unplug, unhook, and detangle lines is time consuming. Nursing staff also must assess and evaluate the stability of the patient before implementing early mobility intervention. Assisting a weak and vulnerable patient in walking often requires more than one available nursing staff and allotted time to assist the patient. Overall, the time to prepare a patient to mobilize is far greater than the time the patient is mobilizing and can easily be less of a priority and ignored.

Implementing early mobility programs requires an interdisciplinary team approach to include the physician; respiratory, physical, and occupational therapists; RN, and APN. One of the most important qualities in working with a multiple discipline team is communication, well-established and defined roles. One of the barriers to implementing early mobility programs is the reliance on other disciplines to implement and accomplish the intervention. There are vague parameters as to which discipline, if not more than 1, is responsible for initiating and evaluating the patient's mobility and progress.

Interventions to promote early mobility

The success of implementing early mobility programs requires addressing other variables that influence mobility. One of the factors is daily disruption of sedation. A patient requires a disruption of pharmacological sedatives to appropriately assess the stability and safety of the patient. Daily disruption of sedation also decreases the risk for delirium and cognitive impairment that can hinder the patient from mobilizing early.¹⁰ Consequently, daily disruption can address the barrier of safety. Another suggestive intervention to facilitate early mobility is early tracheostomy. The feasibility of early mobility of patients that are mechanically ventilated may be pos-

sible by initiating tracheostomy if a patient is thought to require long-term respiratory assistance.

A more general observation of how to promote early mobility relies on the role of the APN such as the CNS. The CNS has the opportunity to establish rehabilitation programs in the ICU, promote in service education for intensive care staff, and more importantly changing and promoting a culture of a more awoken ICU with emphasis on the ABCDEs of the ICU. Rehabilitation programs that include medical and nursing guidelines can steer the proper use of sedation and mechanical ventilation that effect early mobility. The CNS can demonstrate how to appropriately implement rehabilitation programs, educate nursing staff on the evidence-based research about early mobility, and inform patients and families about what the public should expect of the ICU to improve patient outcomes.

Implications for future research

Addressing the interventions necessary to encourage early mobility in the ICU sheds light on the role and influence of the CNS. Currently, there is a lack of early mobility protocols in the ICU. Non-physician-directed protocols and guidelines are a method to reduce delays and ensure a more standardized and efficient practice of care for management of sedation, weaning, and early mobility. The CNS is an expert in direct patient care and complicated patients and can utilize the evidence-based knowledge and research to implement standardized protocols and guideline. Parameters can be established to ensure safety such as appropriate ventilator settings, appropriate mode and intensity of mobilization specific to patient needs, safe limits in vital sign stability, and clearly define the distribution of responsibility among the physical and occupational therapist and the bedside nurse.¹¹ Evidence-based research can define the components of training programs such as type, frequency, intensity, specificity, and emphasize the long-term benefits to patient outcomes when practicing evidence-based interventions.

Changing the culture of the ICU requires participation of all health care disciplines and a foundation of evidence-based research. Changes can begin by reorganizing and managing current prac-

tices that may interfere with the initiation of early mobility, creating a strategy or algorithm to promote interdisciplinary teamwork, and linking effective practice interventions.¹¹

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