Reducing Hospital Length of Stay for Adult Critical Care Patients by Utilizing a Nurse Driven Early Mobility Protocol.

Stacy Salanger

Touro University, Nevada

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DNP Project Team: Dr. Jessica Grimm DNP, APRN, ACNP-BC, CNE

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S. Salanger, MSN, FNP-C, CCRN, J. Grimm DNP, APRN, ACNP-BC, CNE

Nurse-driven early mobility protocols are cost effective and pose minimal risks to patients. The purpose of this quality improvement project was to determine if the AHRQ nurse-driven early mobility protocol would improve functional status and decrease hospital length of stay among adult patients in an ICU over four weeks. To promote functional outcomes, PADIS Guidelines was used to incorporate spontaneous awakening trials on the mechanically ventilated, the use of sedation/analgesia to target alertness, delirium monitoring, and assessing early mobility/exercise status. The JH-HLM scale was the framework of the project to measure patients' functional status at admission to the ICU (baseline) and discharge (post-implementation). A Wilcoxon Signed Ranks test showed no statistically significant improvement in patients' functional status $z = -1.22$, $p = .111$). Nonetheless, an extreme outlier was identified and when this outlier was excluded, the mean change in BI scores increased to 6.357 from 5.462, and statistical significance was achieved ($z = -2.244$, $p = .012$). An independent sample T-test showed a slightly longer length of stay in the ICU ($M = 6.54 + 3.45$, range 2-13) when compared to those who could not participate in early mobility ($M = 5.76 + 2.87$, range 2-11). This was not statistically significant, with a p-value of 0.62. Based on these results, the AHRQ nurse-driven early mobility protocol may enhance patients' functional status and decrease hospital length of stay. Continuous implementation is necessary to identify the barriers and limitations of a nurse driven early mobility protocol.

Keywords: Nurse-Driven Early Mobility Protocol; Hospital Length of Stay; Intensive Care Unit.

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Lack of early mobility in hospitalized adults in the intensive care unit (ICU) is associated with physical deconditioning, hospital associated delirium, and prolonged hospitalization (Fazio et al., 2016). These combined factors contribute increased risk for poor health outcomes such as falls, pressure ulcers, hospital acquired pneumonia, longer duration on mechanical ventilation, increased morbidity and potential mortality. Long-standing evidence shows that early mobility decreases such factors as previously mentioned, but bedrest still continues to be the standard of practice for many intensive care units (Hashem et al., 2016). There is a gap in the existing practice of keeping ICU patients on bedrest with current research, which promotes early mobility for this type of patient. The DNP prepared nurse can bridge the gap between research and clinical practice through an evidence-based nurse-driven early mobility protocol [NDEMP] (Chism, 2019).

Background

The purpose of this quality improvement initiative of a nurse driven early mobility protocol is to introduce an evidence-based practice change in the intensive care unit with the aim of improving knowledge, attitude, and behavior that directly impact the factors associated with patient hospitalization length of stay. The goal is to evaluate whether an early nurse driven mobility protocol will reduce the combined factors that contribute to increased risk for poor health outcomes such as falls, pressure ulcers, hospital acquired pneumonia, longer duration on mechanical ventilation, increased morbidity and potential mortality, versus the current practice at the project site of not having an early nurse driven mobility protocol. Adult ICU patients are

particularly vulnerable and at a higher risk for complications that could potentially prolong their hospitalization.

According to Parry and Puthucheary (2015), prolonged bedrest and immobility can lead to rapid reduction in muscle mass and bone mineral density within the first week of bed rest. Studies focused on bed rest have demonstrated that up to 40% of muscle strength can be lost during the first week of bed rest due to reduction in muscle fiber size (Parry & Puthucheary, 2015). One human trial demonstrated a dramatic increase in muscle protein degradation of up to 160 % (Kourek et al., 2022). Other organ systems are also affected by bedrest and immobilization. Research conducted by Maggioni et al. (2018) has concluded that within 72 hours of patient inactivity there is central and peripheral cardiac deconditioning. This includes a 30% reduction in stroke volume, increase in resting heart rate and signs of orthostatic intolerance (Parry & Puthucheary, 2015).

Early mobility of patients in the intensive care unit can improve the forementioned factors which overall decreases hospital length of stay. A systematic review was conducted by Arias-Fernandez et al. (2018) that analyzed 11 studies with a total of 850 participants. Participants were either assigned to the intervention group of early hospital mobility or the control group, no early mobility intervention. Early mobility and rehabilitation were associated with an increase in functional capacity, muscle strength, shorter duration of mechanical ventilation, improvement in walking distance, and better perception of health-related quality of life (Arias-Fernandez et al., 2018). Similarly, Zhang et al. (2019) conducted a systematic review and meta-analysis that included 23 randomized controlled trials of early mobility, comprising 2,308 critically hospitalized patients. Results concluded early mobility decreased the incidence of ICU-acquired weakness at discharge, increased the number of patients who were able to stand

and walk unassisted, increased the number of ventilator-free days during hospitalization and decreased hospital length of stay (Zhang et al., 2019).

Problem Identification

At the chosen project site, there is not a NDEMP in place. In current practice, all patients admitted to the intensive care unit are placed on strict bed rest as part of an admission order set placed by the provider. Upon daily re-evaluation, the provider will decide when it's deemed appropriate to order a physical and occupational therapy evaluation. However, this can lead to disagreements amongst the inter-collaborative team due to poor communication. Having a NDEMP will decrease the need to be dependent on provider's daily re-evaluation and increase autonomy of the bedside nurse providing care. According to Govasli and Solvoll (2020), if nursing staff have increased patient ratios, it may decrease the amount of time they can spend with mobilizing patients. The use of a NDEMP will allow the nurses to structure their shift accordingly and prioritize patient care to include mobilization.

At the project site, there are physical therapists and occupational therapists that do not feel comfortable providing rehab to ICU patients. A systematic review conducted by Lau et al. (2016) resulted that rehab providers (occupational and physical therapists) that work in acute care must possess in-depth knowledge of multiple body systems and unique skills that can accommodate complex medical care for a short length of therapy time. A lack of confidence or experience amongst rehab providers can interfere with the rehab potential for patients. Furthermore, due to lack of standardization and no current protocol at the project site, it leads to a prolonged period of immobilization for patients in the ICU. Research by Marra et al. (2017) revealed patients on mechanical ventilation with prolonged immobilization may lose up to 18% of total body weight by the date of discharge. Furthermore, the consequence of physical

dysfunction in the adult critical care patient can be profound and evidence has shown that patients have a reduction in functionality at even 1 year and 5 years post ICU discharge (Marra et al., 2017).

Inadequacy in the healthcare delivery system such as a lack of early mobility of ICU patients adversely affects the community as a whole, not just individual patients (SQUIRE, 2020). Prolonged length of stay in the hospital with longer duration of immobility leads to higher morbidity, mortality, and drives up the cost of care (Marra et al., 2017). This directly impacts hospital finances and ability to allocate resources. Evidence-based research has shown safe, early ambulation in the ICU are cost effective, do not require an increase in staffing needs, and can promote functional independence in patients without adverse reactions (Schmidt et al., 2016).

A nurse driven early mobility protocol at the chosen project site will be multifaceted to include a protocol order set initiated by the provider, a nurse driven mobility guideline, and culture workshops with education. Interprofessional collaboration will involve stakeholders at the local and administrative level. The benefits of such a quality improvement initiative for the project site may include reducing costs via decreased length of stay, improving Medicare reimbursement by preventing hospital acquired complications, and reducing the incidence of hospital readmissions (Schmidt et al., 2016).

Project Question

The project question will be developed using the PICOT format and by performing a gap analysis to identify a current practice problem. The gap analysis will compare current patient mobility performance with desired, expected performance after project implementation (Kenton, 2020). A literature review of relevant, up-to-date research has provided evidence of practice deficiencies within the adult ICU at the project site. The project question is; will the ICU bedside

nursing staff reduce hospital acquired complications thus reducing the patients' length of stay by using an evidence-based, nurse-driven early mobility protocol compared to the current practice of no early mobility in the ICU within a 4–5-week timeframe?

Search Methods

Electronic databases used in the search for evidence included PubMed, Cochrane, Google Scholar, The Cumulative Index to Nursing and Allied Health Literature (CINHAL), and the Jay Sexter Library. Key words included "early mobilization", "ambulation", "nurse-driven". "protocol", "intensive care unit", "critically ill", "rehabilitation", "hospitalization", and "length of stay". Appropriate literature was selected through the use of evidence-based inclusion criteria to find the highest level of evidence. Inclusion criteria were adult ICU patients between the ages of 18 and 99, the English language, peer reviewed articles, meta-analyses, systematic reviews, and original studies. There were approximately 332 articles available on the combined search engines of PubMed, Cochrane, Google Scholar, and CINAHL. To narrow the article selection, a title search was performed to determine article relevance to the project.

Based on relevance of the title search, an abstract review was performed to determine the relevance of the selected articles to the topic NDEMP. An abstract review assisted in measuring level of technicality, evidence, and core findings (Bouchrika, 2021). Articles were included if content focused on hemodynamically stable ICU patients on mechanical ventilation, extracorporeal membrane oxygenation (ECMO) and continuous renal replacement therapy (CRRT). Articles were excluded if subjects were hemodynamically unstable limiting participation or centering on rehabilitation occurring outside of the ICU.

Study Methods

In total, sixteen articles were chosen and references were evaluated from the key articles to search for additional sources of evidence. The evidence was examined in reference to the PICOT question based on the rating method described by Melnyk et al. (2015). Studies were methodically categorized from level I to VII, level I being the highest level of evidence. For selection, studies were not limited based on level of evidence. Of sixteen articles, there is one systematic review (level I), one retrospective analysis (level I), two randomized control trials (level II), two cohort studies (level IV), one observational study (level VI). Nine articles are foundation knowledge or of expert opinion (level VII). The level VII articles contain detailed early mobility protocols. Study methodologies were reviewed in the selected literature with the development of themes that are relevant to this DNP project of NDEMP. The study methods are appropriate for this DNP project as they are consistent and valid, yielding results of early mobility and the impact on decreased hospital length of stay.

To develop the proposal, current best practices through professional organizations and government websites were reviewed to assist in the development of a NDEMP at the project site. Professional organizations included the Centers for Medicare and Medicaid Services, Society of Critical Care Medicine, American Association of Critical Care Nurses, and the Agency for Healthcare Research and Quality.

Literature Synthesis

Once the search for literature was completed the project lead reviewed the evidence provided. There were several common themes noted that pertained to early mobilization of the critically ill patient admitted to ICUs. Current practice regarding early mobility within the ICU at the project site has demonstrated a huge practice gap when compared to best practices found in

this review. Potential causes for this practice gap consist of a knowledge deficit in the benefits of early mobility, a lack of standardized protocol, and fear of causing more harm from all members of the multidisciplinary team.

The initiative of NDEMP has been in effect for several years and is used by many hospitals as a quality indicator. According to Bergbower et al. (2020), hospitalization in the ICU is associated with functional decline from multifactorial origins attributed to poor pain management, improper nutrition, sleep disturbances, and prolonged immobilization. An observational study conducted by Baldwin et al. (2019), demonstrated that hospitalized patients are immobilized infrequently and spend a majority of time in bed. As such, critically ill patients are susceptible to nosocomial complications including incapacity to preform activities of daily living (ADLs), need for discharge to rehabilitation centers, and frequent readmissions (Bergbower et al., 2020).

Early mobilization continues to be an effective therapeutic intervention to improve outcomes among ICU adult patients. Research consistently validates that NDEMP enhances utilization of hospital resources, improves length of hospital stay, and reduces potential medical consequences such as falls, pressure ulcers, hospital acquired pneumonia, duration on mechanical ventilation, morbidity and potential mortality (Bergbower et al., 2020).

Theme Development

Several common themes arose as the literature review progressed. Early mobilization of critically ill patients is not without risk. However, to support an early mobility protocol within the ICU, it is important to understand the devasting effects that lifesaving care has on patients who are required to have long-term ventilation, prolonged bedrest and immobility (Adler & Malone, 2012).

Impact of Immobility

Periods of immobility during hospitalization can result in sarcopenia, severe muscle loss and functional decline. During hospitalization, sarcopenia is associated with increased length of hospital stay, worsened prognosis, and increased mortality (Hashem et. al, 2016; Kourek et al., 2022, Goates et al., 2019). Additional inpatient costs are attributable to hospital-acquired conditions (HAC) that can result from prolonged immobilization. This escalates the economic burden on the healthcare system (Goates et al., 2019; AHRQ, 2017). Goates et al. (2019) conducted a retrospective analysis of cross-sectional surveys obtained from the National Health and Nutrition Examination Survey (NHANES). Results concluded that critically ill patients with sarcopenia had a longer duration of hospitalization with an average increase in cost of $2,315.7 per patient (Goates et al., 2019).

Similarly, in 2015, the AHRQ reported that hospitals incur an estimated additional $5,746 per patient with a HAC resulting from prolonged immobilization in comparison to a patient without an HAC (Inouye et al., 2017).

Quality Indicators

The use of "ABCDEF" bundles are quality indicators for the ICU. These propel best practices and institute early mobilization protocols. ABCDEF bundles incorporate conducting spontaneous awakening trials on the mechanically ventilated, the use of sedation/analgesia to target alertness, delirium monitoring, assessing early mobility/exercise status, and family involvement in care (AHRQ, 2017; Society of Critical Care Medicine, 2018). ABCDEF bundles that are standardized can be used with available inpatient ICU data to measure and trend clinical performance and outcomes.

A randomized control trial conducted by Brown et al. (2022) assessed the impact of performance measurement, feedback, and data literacy training of ICU bundles to include early mobility. For this study, four ICUs were utilized with the intervention group receiving bundle-related early mobility education, data literacy training, and weekly performance reports during a 12-month period (Brown et al., 2022). The non-intervention group received no interventions. Bundle compliance as well as patient outcomes were tracked by measuring mechanical ventilation, ICU delirium, mortality, and discharge disposition. The use of staff education on early mobility for the intervention group, increased ICU bundle compliance from 9% to 16% with data literacy increasing from 16% to 21% (Brown et al., 2022). Staff education and ICU bundles are associated with a lower likelihood of hospital mortality, improved patient outcomes such as decreased duration on mechanical ventilation, reduced delirium, and improved home discharge rates (Brown et al., 2022; Sweeney, 2018).

Centers for Medicare and Medicaid Services (CMS)

To deter adverse medical events, the CMS created a mobility action group with the goal "to test or implement strategies for increasing early mobility in the acute care setting" (Inouye et al., 2017). In 2017, the mobility action group created a mobility change package to organize strategies, change concepts, tactics, tools, and measure domains (Inouye et al., 2017). The mobility change package has four strategies to facilitate safe, early mobilization of ICU patients.

The mobility change package begins by facilitating a mobility culture in the ICU through communication of expectations, collaboration to meet functional goals, and visual reminders of mobility goals in patient rooms and in the hallway (Inouye et al., 2017). The second strategy is to assess and plan for mobility by standardizing nursing mobility assessment on admission in discharge. This strategy also includes assessing for acute mental status changes and utilization of

a progressive mobility tool. The third strategy is to provide early mobilization with safe approaches through training and demonstrations of safe body mechanics for nurses, aides, and physical therapy technicians. Safe approaches include providing gait belts, assistive devices, and fall prevention with unit-specific generated reports on mobility rates and falls (Inouye et al., 2017). The last strategy is to minimize immobilizing devices by developing purposeful rounding, usage of bed/chair alarms, and reducing all tethers such as urinary catheters, oxygen tubing, and compression devices.

Society of Critical Care Medicine (SCCM)

In 2018, The Society of Critical Care Medicine's developed the PADIS guidelines to discuss the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult patients in the ICU. The PADIS guidelines are a multidisciplinary approach to managing critically ill patients from a patient-centric perspective (SCCM, 2018). The lack of sedation interruptions for mechanically vented patients, poorly managed pain, strict bedrest, and sleep disturbances may result in self extubation, confusion, and injurious falls (Zhang et al,, 2019). The PADIS guideline advocates for reflection on current practices, gap identification, and the use of strategies to enhance the care of the critically ill with an end goal of reducing hospital length of stay (SCCM, 2018). Critical outcomes that are able to be evaluated via data after utilizing the PADIS guidelines in a NDEMP include muscle strength at ICU discharge, duration of mechanical ventilation, quality of life, hospital mortality, and physical function (SCCM, 2018). The critical outcomes that are insufficiently evaluated include cognitive function, mental health, and ability to return to work/economic status.

Based on available research, the SCCM panel determined desirable consequences of early mobility outweigh undesirable consequences (SCCM, 2018). Formal recommendations for

standard of care include performing rehab activities at an earlier onset in the critically ill as serious safety events do not commonly occur (SCCM, 2018). In ten observational studies and nine randomized controlled trials, serious safety events as a result of early mobilization were rare, 15 during a total of 12,200 session, with most being respiratory related, four desaturation and three unplanned extubations (SCCM, 2018).

Agency for Healthcare Research and Quality (AHRQ)

AHRQ is an accredited QI organization that has developed performance, criteria, and safety measures for early mobilization of patients. AHRQ has specific recommendations that encompasses methods, processes, tools, and resources to overcome the barriers of facilitation that can aid in the implementation of a NDEMP and monitoring patient health outcomes (AHRQ, 2017). The main recommendation from the AHRQ (2017) is to embed comprehensive functional assessments from care providers with strategies to maximize functional status to prevent decline during hospitalization. Research recommends adopting an evidence-based early mobility protocol led by nursing staff as a benchmark for best practice to prevent functional decline (Sweeney, 2018).

Early Mobility Protocols

The American Association of Critical Care Nurses [AACN] (2022) has organized several early mobility protocols with implementation into the clinical setting. The AACN (2022) designed a mobility program inclusive of protocol development, integration of a mobile gym in the ICU, and initiation of a nurse led interdisciplinary communication model. An ICU at Abington Memorial Hospital in Abington, PA implemented a NDEMP as guided by the AACN. Project outcomes from the initiative showed the median number of hours from admission to physical therapy evaluation decreased by 32%, median number of hours from admission to

occupational therapy evaluation decreased by 16%, the unit length of stay decreased by 9% to 3.73 days, and length of stay lead to an estimated annual saving of $143,454 (AACN, 2022).

The Johns Hopkins Highest Level of Mobility (JH-HLM) Scale is a systematic guide that combats the harm of immobility through an inter-professional program to provide tools and resources to increase patient mobility (The Johns Hopkins University, 2022). The JH-HLM has been used as a standard of care quality indicator for early mobility protocols. According to Bergbower et al., (2020) early mobility for critical care patients showed an increase in JH-HLM score improvement by 31.3% after implementation of the NDEMP, in comparison to prior non-implementation of 21.5%. Furthermore, early mobility protocols lessened hospital readmissions within 30 days of discharge from 22% to 10.4% and shortened length of ICU stay from 5.8 days to 4.8 days (Bergbower et al., 2020)

Assessing analgesic use and decreasing sedation is a key aspect in promoting early mobility in critically ill patients. The blind randomized control trial conducted by Schweickert et al. (2009) is considered a landmark for its evaluation in the effectiveness in the use of daily sedation vacations with combined mobility therapy sessions to improve functional and health outcomes for patients in the ICU. This study included 104 ICU patients that were divided into a control and intervention group (Schweickert et al., 2009). The control group received early mobility without a pause in sedation, known as a sedation vacation, whereas the intervention group did have a sedation vacation, or a purposeful interruption. At hospital discharge, a return to baseline functional status occurred in 59% of patients in the intervention group in comparison to 35% in the control group (Schweickert et al., 2009). The patients in the intervention group had shorter duration of delirium and ventilator days. This evidence suggests whole-body

rehabilitation of sedation vacations and early mobility is safe and well tolerated, leading to better outcomes for patients in the ICU in comparison to standard care.

Safety and Feasibility

Safety and feasibility are important factors that will determine the success of the implementation of a NDEMP. An observational study conducted by Hickmann et al., (2016) and a systematic review conducted by Alaparthi et al., (2020) highlighted the effectiveness of nurse driven early mobility protocols in the ICU. Despite mechanical ventilation, vasopressor administration, and renal replacement therapy, hemodynamic parameters are not significantly impacted during mobilization and activities were well tolerated (Hickmann et al., 2016; Alaparthi et al., 2020). There are indicators to stop mobilization, to include falls, medical device removal or malfunction, and patient distress, as concluded during 14 randomized controlled studies utilizing 2,617 patients (SCCM, 2018). Improvements in early mobility are not associated with a statistically significant rate of injurious falls in comparison to patients on bed rest. (Hickmann et al., 2016; Bergbower et al., 2020).

Barriers to Implementation

Despite evidence that early mobility is safe, feasible, and associated with better health and functional outcomes for ICU patients, barriers to early mobility protocols still persist. A cross-sectional survey conducted by Anekwe et al. (2019) surveyed 274 staff members to examine the perceived barriers to early mobilization. Early mobilization was only perceived to be a top priority in 51% of respondents (Anekwe et al., 2019). The most common reason for leaving a patient on bedrest was due to clinicians feeling uncomfortable. Approximately 58% of survey respondents expressed safety concerns of mobilizing critical care patients due to lack of training and experience (Anekwe et al., 2019).

Further barriers included varied opinions amongst the interprofessional team on permissible level of activity in differing ICU patient scenarios. Similarly, the observational study conducted by Hickmann et al. (2016), narrowed down barriers to implementation and limiting factors in the initiation of an early mobility protocol to reduced staffing capacities, diagnostic or surgical procedures, patient refusal, and severe hemodynamic instability**.**

Project Aims

This DNP quality improvement project is aimed to implement a practice change in the mobilization of critically ill patients in the acute care setting. The overarching aim will be achieved through implementation of an evidence-based nurse driven early mobility protocol by cultivating nursing knowledge, attitude and behavior. Based on evidence discussed in the literature synthesis, bedrest is not the standard of care and the best practice recommendation is to implement early mobility for critically ill patients. The aspiration of this quality improvement project is to recognize and target perceived obstacles to mobilizing hospitalized patients in the ICU by critical care registered nurses. The NDEMP will be designed to address the common practice of bedrest and to evaluate the effectiveness of structured education surrounding mobility that would impact nurse knowledge to provide early mobilization. Structured training will be provided to meet the educational needs of the critical care registered nurses.

In the initial planning phase of the NDEMP, an early-mobility survey will be conducted via Google Forms with a target audience of nursing staff in the ICU. The survey will identify gaps in knowledge, attitude, and behavior surrounding early mobilization of patients. After the data is collected, an analysis of the survey data will disclose barriers to patient mobility and the opportunity to change current practice through early mobility strategies.

Project Objectives

The following objectives to implement an evidence-based nurse driven early mobility protocol. will be met in the timeframe of this DNP Project:

1. Administer an educational program for the multi-disciplinary team to train on early mobility.
2. Decrease hospital length of stay (LOS) by 25%, using pre and post implementation data.
3. Increase rate of mobility in the ICU by 15%, using pre and post implementation data.

For the purpose of the NDEMP, LOS will be defined as an adult patient who spends any amount of time in the ICU during hospitalization. There will be no differentiation in data for patients with only ICU time versus some time spent on the medical-surgical floor and in the ICU. The ICU LOS data will be compiled from the institution's quality department with statistics from the previous six months being used as a bench mark for comparison to post-implementation LOS data. Post-implementation ICU LOS data will be measured at intervals of 2-weeks, 3-weeks, and 4-weeks to be analyzed to determine the impact of a NDEMP in the ICU on hospital LOS. Furthermore, rate of mobility will be defined as the highest level of functional mobility for an ICU patient, to be measured using an ICU mobility scale. Rate of mobility will be measured at intervals of of 2-weeks, 3-weeks, and 4-weeks post-implementation.

Theoretical Framework

Change is crucial in healthcare systems in order to provide high quality, evidence-based care to patients. In order to facilitate change at the organizational level, theoretical frameworks are used to provide methodical perspective of identifying events and situations. A theoretical framework lays the foundation of concepts to define or explain situations through the evidence of

relationships that exist between variables (Heale & Noble, 2019). The NDEMP will be developed and implemented using the theoretical framework of Kurt Lewin's Theory of Change.

In 1947, Kurt Lewin theorized a three-stage model of change that requires previous learning to be discarded and replaced. Kurt Lewin's Theory of Change facilitates transformation on the individual level through self-reflection of knowledge in three stages to include unfreezing, change, and refreezing (Wojciechowski et al., 2016). The first stage in Kurt Lewin's theoretical framework is unfreezing, which is the process of finding a method of making it possible for people to let go of all behaviors and patterns that were counterproductive. In this stage, a person must overcome individual resistance as well as group conformity. In order to be successful in the second phase, the change stage, there must be a personal motivation to move away from the bad behavior through a change in thoughts, feelings to become more productive (Wojciechowski et al., 2016). The last stage is refreezing, which establishes the change as a new custom, so it becomes standard practice.

Application to DNP Project

In the initial stage of unfreezing, the inter-collaborative team assigned to the ICU, which includes bedside nursing, physical/occupational therapists, and aides, will be assessed in the readiness to change current practice of bedrest. During the pre-implementation of the NDEMP, staff motivation will be crucial to facilitate individual behavioral change in respect to attitude with overall positive cultural transformation. Communication will be imperative in conveying the importance of early mobility versus bedrest and to heighten awareness of gaps in practice.

The second stage of Kurt Lewin's Theory of Change will be used as a framework to shift the NDEMP into a new paradigm. To achieve new behaviors, values, and attitudes in the ICU staff, educational sessions will be provided that focuses on evidence-based guidelines, resources,

and tools participants can use for early mobility processes and measurement. This second stage will include an introduction of the JH-HLM scale and PADIS guidelines into bedside practice.

The final step, after the implementation of the JH-HLM scale and PADIS guidelines, is freezing the changed behaviors. According to Lewin, this step integrates the values of early mobility to stabilize the new equilibrium in the ICU from the modified practice by supporting driving forces and limiting restraining forces (Wojciechowski et al., 2016). The ICU staff, specifically the bedside nurses, will be able to demonstrate the integration of a NDEMP and sustainability through new attitudes and behaviors that shifted away from the idea of complete bedrest for ICU patients. Sustainability of this new practice will be monitored during shift huddles, nursing handoff at the bedside, and interdisciplinary rounds.

Project Setting

The project setting for the NDEMP quality initiative is the ICU in a rural hospital located in Central New York. More specifically, the hospital is in Cortland County, which has a small population of 47,581 people (United States Census Bureau, 2021). The closest metropolitan area to the project site is the city of Cortland, which has a population of around 18,739 people (United States Census Bureau, 2021). The facility is not a trauma center, but rather a level three hospital that uses limited resources to serve the local community as efficiently as possible. Up until three years ago, the hospital was a private, non-profit entity. However, the hospital was bought and acquired by a healthcare conglomerate network, called the Guthrie Clinic. With the community hospital being engulfed by a larger network, the organizational structure shifted, leading to changes in culture, practices, and policies at the project site.

In total, the project site has 144 acute-inpatient beds, 12 of which create the ICU. The ICU is for patients aged 18 years and older. It’s also considered “open” which means the

hospitalist service takes care of all patients with an intensivist who rounds in the morning and is on call for assistance if needed. On a typical day in the ICU at the project site, approximately five or six patients will be under the status of critically ill, the remainder of the ICU beds will be used for telemetry, or "step-down" categorized patients. For the ICU patients, the staffing ratio is two patients to one nurse or even three patients to one nurse depending on the staff availability.

To promote higher quality and safer care, the project site shifted to hiring third party agencies to provide critical care traveling RNs to fill the staffing gap in the ICU. Often, there is a negative perception that travel RNs are not as efficient as staff nurses, but there is no research evidence to support this idea (Faller et al., 2017). Therefore, it's crucial to understand the effect that critical care travel RNs have on the ICU culture, quality of patient care, and patient experience.

Population of Interest

The patient population of interest are adult patients admitted to the ICU under the critical care service. Inclusion criteria are patients aged 18 and above with no limitation to those on mechanical ventilation by means of nasotracheal, endotracheal, or tracheal intubation, continuous renal replacement, left ventricular assist device, or extracorporeal membrane oxygenation. Exclusion criteria are patients with a palliative care order, Richmond agitation sedation scale of -1 or greater, and hemodynamic instability as defined by a mean arterial pressure (MAP) <60 requiring vasopressors, or a positive end expiratory pressure (PEEP) > 10 cmH2O (Buitenwerf et al., 2019).

The indirect population of individuals that will be impacted by the NDEMP are registered nurses (RNs). Specifically, the RNs that will be involved in implementing the early mobility protocol are those who are critically care trained to be working in the ICU. Training and

education will be provided directly to the critical care RNs and will be a major component to the success of the quality initiative.

Stakeholders

Implementation of the NDEMP quality initiative requires support from multiple levels within the Guthrie organizational structure. Permission to complete the project at the host site was obtained from the chief medical officer. Furthermore, the education coordinator deemed an affiliation agreement was not necessary to perform the project. Literature has shown the progressive impact that active participation from stakeholders has on the adoption of innovative healthcare system change (O'Rourke et al., 2016).

The project requires support and assistance from the informatics department to create the NDEMP order set in the electronic medical record, EPIC. Nursing informatics personnel will also be necessary during project implementation to obtain access to electronic medical records, workflow, and processing of data. To ensure nursing staff have familiarization with the new order set in EPIC, the clinical educator and ICU nurse manager have an important role to provide didactic and hands-on educational sessions. Hands-on education to include proper body mechanics through collaboration with rehabilitation services, occupational and physical therapy. The involvement of a multidisciplinary team to implement the NDEMP at the project site will mold the direction of activity planning, implementation, and evaluation through varying expertise and opinions (O'Rourke et al., 2016).

Interventions

The interventions needed to meet the project objectives will be described in terms of Kurt Lewin's Theory of Change, that requires previous learning to be discarded and replaced (Wojciechowski et al., 2016). The intervention timeline is displayed in Appendix A.

As of August 2022, the ICU project champions have been identified to include the lead respiratory therapist, director of physical/occupational therapy, clinical nurse educator, and the lead hospitalist. Key research articles as well as the selected early mobility protocol have been distributed via email to all members for review. The ICU project champions will discuss the NDEMP purpose, process, necessary resources, clinical implications, expected outcomes, and sustainability efforts. After appraisal and synthesis of evidence, as well as reviewing the selected tools and AHRQ early mobility protocol, step two of the intervention timeline will be the change stage. In order to be successful in this stage, there has to be personal motivation within the interdisciplinary team and support from stakeholders to move away from previous behaviors and become open-minded about a NDEMP (Wojciechowski et al., 2016).

In the change stage, various stakeholders will be a critical necessity for resource allocation, reassurance, and support. Personal motivation within the interdisciplinary team, especially the staff nurses in the ICU, is a potential barrier to implementation of a nurse driven early mobility protocol. Dubb et al. (2016) conducted a systematic review in which their findings suggested that standardize practice gained the support of staff nurses and increased out of bed activity for patients. The AHRQ early mobility protocol will be used to help develop a standardized NDEMP in this project.

As previously mentioned, resources will be obtained from stakeholders. Rudimentary physical resources include mobility assistive devices, such as rolling walkers, sit-to-stand, wheelchairs, and mobility belts (Schweickert et al., 2009). Collaboration with the lead rehab therapist is fundamental to ensure there is ample equipment in sufficient condition. The essential human resources comprise of adequate staffing, mobility is dependent on the availability of the

bedside RN and other disciplines. This will fluctuate dependent on staff on hand in the hospital, having a direct impact on the NDEMP.

The concept of a NDEMP will be introduced to staff beginning in October 2022 through a lecture provided by the clinical educator. There will also be distributed handouts in the ICU to allow for review and familiarity prior to implementation (Appendix B and C). The clinical educator is the liaison for answering clinical questions surrounding the NDEMP. After ample time to review the upcoming change, step 3 of the freezing stage will begin. Starting in November 2022, the multidisciplinary team comprised of the ICU project champions will begin to round in the ICU to aid in implementation of the NDEMP. A rounding script has been drafted and will be utilized by the bedside RN for each patient to evaluate pain, sedation, mental status, and mobility criteria (Appendix D). According to Dubb et al. (2016), multidisciplinary rounding assists in problem-solving, facilitates communication, and assesses whether early mobility is appropriate based on objective and subjective factors. Leadership will work to assist in guaranteeing high quality of care is maintained and the nurses feel adequately supported. The projected timeline for the quality improvement project is from November to December 2022, refer to Appendix A. Outcomes will be examined retrospectively 5 weeks before implementation starting in October 2022 and then 5 weeks after, with weekly evaluation of resources to sustain the change. This will determine the impact of the NDEMP on duration of time in the ICU and hospital length of stay.

Tools

There are several tools that will be necessary to achieve the project objectives and to carry out interventions of the quality improvement project of a NDEMP. According to AHRQ (2017), three independent systematic reviews of 15 studies reported that early mobilization for

critically ill patients demonstrated no serious adverse events with removal of lines or tubes being rare. Based off positive implications, the AHRQ nurse-driven early mobility protocol was selected to be used. Within the AHRQ protocol, is an early mobility algorithm that determines if a patient is appropriate to be mobilized. Bedside ICU nurses will be familiarized with this tool and use objective data to determine if a patient meets mobility criteria, if they do, the nurse will proceed with the mobility protocol. The nurse will then document progression of mobility using the JH-HLM score (Appendix E).

AHRQ Early Mobility Algorithm and Protocol

Funded by the U.S. Department of Health & Human Services, the AHRQ early mobility protocol is a validated tool that has been used as framework for standardization of care (AHRQ, 2017). The AHRQ early mobility algorithm (Appendix B) will be utilized by the bedside RN for each ICU patient and reevaluated on a daily basis. The ICU nurses will be required to use objective data to determine if the patient meets inclusion or exclusion criteria for early mobility. According to AHRQ (2017), exclusion criteria of patient involvement in early mobility includes respiratory criteria or FiO2 > 0.6, PEEP > 10 cm H20, hypoxemia with a pulse oximetry < 88%, tachypnea with a respiratory rate > 35 and/or acidosis with an arterial pH < 7.25. The circulatory exclusion criteria include new or increase vasopressor dose within the past two hours, continuous infusion of a vasodilator medication, addition of a new anti-arrhythmia agent within the past 24 hours, unstable arrhythmia within 24 hours, MAP > 140mmHg OR <55mmHg, or a new DVT/PE within the previous 24 hours. Other possible early mobility exclusion criteria that would have to be evaluated on an individual basis include hemoglobin <7gm, platelet count < 20,000, transvenous pacemaker, femoral arterial line, and an intra-aortic balloon pump. If a

patient does not have exclusion criteria that would prevent early mobility according to the algorithm, the nurse will then proceed with the early mobility protocol.

JH-HLM score

As part of the NDEMP, nurses are required to document daily JH-HLM scores in the EMR, Epic. The use of the JH-HLM score has been validated by previous studies and is considered an excellent inter-rater reliability tool for adult ICU's (Bergbower et al., 2020). The use of the JH-HLM scale standardizes the description of patient mobility using a numerical score of what the patient actually accomplishes, not what they are capable of (The John Hopkins University, 2022). Documentation is based on nursing observation and reflects highest accomplished level of mobility. Use of the JH-HLM has also been associated with shortened length of stay and decrease risk of hospital readmission within 30 days of discharge (Marra et al., 2017). The patient's JH-HLM score will be discussed during daily interdisciplinary ICU rounds with a focus on how the scores can be improved.

Staff Education PowerPoint

The first week of November is the "go-live" date for staff education on the NDEMP. Education will be provided in the form of a PowerPoint, utilizing the AHRQ's facilitator guide on nurse-driven early mobility protocols, refer to Appendix F. The PowerPoint will be printed out and placed in the ICU break room for nurses to review and sign off for accountability. It will also be discussed during huddles before change of shift. The clinical educator and nurse manager of the ICU will act as liaisons for specific questions and further clarification if warranted.

Chart Review Tool

For ICU length of stay, this will be defined as the time that admit orders to the ICU are placed until the time that transfer orders are placed. Based on this, length of patient stay in the

ICU can be documented and then averaged using descriptive statistics. For mobility rates, there are inclusion/exclusion criteria within the ICU early mobility algorithm, documented by the bedside nurse, as seen in Appendix B. Length of stay in the ICU will be specifically for the patients who met mobility criteria and were mobilized, compared to the patients who met criteria for mobilization but did not. To determine if a patient met criteria for mobilization but failed to mobilize, a daily early mobility data collection tool will be used to organize data collected by the bedside RN (Appendix G). Descriptive statistics will be used to evaluate compliance of the NDEMP protocol. This will be accomplished by reviewing 50 patient charts pre-implementation and 50 charts post-implementation with comparison of results. The host site informatics nurse was consulted to verify technological capabilities of chart review for specific data to include patients that meet mobility criteria as outlined in the early mobility algorithm.

Study of Interventions, Data Collection

The procedure used for collecting data for the NDEMP QI project will be to review 50 patient charts pre-implementation and 50 charts post-implementation within 5 weeks with comparison of results. The host site informatics nurse was consulted to verify technological capabilities of chart review for specific data to include patients that meet mobility criteria as outlined in the early mobility algorithm. In order to maintain confidentiality during this time, participant privacy will be protected by removing personal identifiers to include name, age, and gender. During in the initial stages of chart review, collection of data will be completely anonymous and based solely on meeting early mobility participation criteria. Data will be stored using encrypted computer-based files, while all paper documents will be locked in a filing cabinet in a private office.

The NDEMP QI project is to be introduced to the RNs in the ICU at the host site via educational sessions in the form of handouts and a power point presentation (Appendix A and F). Daily reminders of the early mobility protocol will occur at daily ICU rounding and shift changes huddles, as directed by the ICU nurse manager.

Ethics and Human Subjects Protection

An ethical and confidential implementation will occur based on human subjects' protection laws. According to US Department of Health and Human Services 2018 human subjects' protection requirements, informed consent can be waived for this quality improvement initiative under 45 CFR part 46, Subpart A (Office for Human Research Protections, 2020). Selecting participants for the quality improvement project will be based on inclusion and exclusion criteria as previously established. The benefits will include the use of early mobility to decrease ICU length of stay and hospital length of stay. The risks for participants include injury or decompensation during early ambulation, which is a hospitalization risk regardless of the QI project. The participants will not be offered monetary compensation during this quality improvement project. There will not be any out-of-pocket expenses for participants, therefore reimbursement unnecessary for circumstance. Determination was made that this QI project does not require an IRB review process, the project site and TUN do not require IRB or QI committee oversight.

Measures and Plan for Analysis

The process of data analysis will be to use the statistical software suite SPSS developed by IBM. Using this software will eliminate the necessity of acquiring a statistician for the quality improvement project. The first project objective, "administer an educational program for the multi-disciplinary team to train on early mobility" does not require data analysis. For the second

project objective, “decrease hospital length of stay by 25%, using pre and post implementation data”, the statistical test chosen is descriptive statistics with confidence interval testing. Descriptive statistics will allow the comparison between pre and post implementation data. This method will also be used to evaluate the third project objective, “increase the rate of mobility in the ICU by 15% based on NDEMP compliance, using pre and post implementation data” with chart review and collection of historical performance data.

There are statistical assumptions that can be made from using descriptive statistics with confidence interval testing in reference to the second and third project objectives. For objective two, the assumptions are that data reflective of a decrease hospital length of stay by 25% after implementation of the early mobility protocol will be normally distributed with no significant outliers. Furthermore, the pre-implementation patient data will have equality of variance to the post-implementation patient data. Lastly, the data are independent with no relationship between the two groups. For the third project objective, an assumption is that the variances of the pre and post implementation groups being compared are homogeneous. Also, there is an assumption of normality that the continuous variables will be normally distributed with results overall showing an increase in the rate of mobility in the ICU based on NDEMP compliance. Furthermore, there is an assumption of linearity. If linearity is not met, the predictions may be inaccurate. An alpha level will be the threshold value used to judge whether a test statistic is statistically significant or not.

Analysis of Results

The clinical question was: To what extent does the implementation of the AHRQ nurse-driven early mobility protocol have on hospital acquired complications, improving functional status, and reducing hospital length of stay when compared to current practice in an ICU in New

York? Twenty-eight subjects were included in data analysis based on inclusion criteria. Sixteen patients were not able to participate in the early mobility protocol based on exclusion criteria. The clinical question was answered using both a Wilcoxon Signed Ranks Test and Independent sample T-test.

A Wilcoxon Signed Ranks Test compares a continuous dependent variable across two time periods. In this quality improvement project, JH-HLM scores were collected at two time periods, with the independent variable as the AHRQ nurse-driven early mobility protocol. The dependent variables were the change in functional status, which was measured by the Johns Hopkins Highest Level of Mobility (JH-HLM) score pre-implementation (admission to the ICU) via chart review and post-implementation (at time of discharge). Admission JH-HLM scores were subtracted from discharge JH-HLM scores to create a new variable, labeled as "change in JH-HLM score". A positive difference indicated improvement in functional status. The JH-HLM scores at admission ranged from 1 to 8 with a mean of 4.683 (*SD* = 2.36). Discharge JH-HLM scores ranged from 2 to 8 with a mean of 5.462 *(SD*=1.86). Despite the increase in JH-HLM score from admission to discharge, the Wilcoxon Signed Ranks test was nonsignificant (z = -1.22, p = .111). A p-value of less than 0.05 was required for statistical significance. The data can be referenced in Table 1.

Table 1
JH-HLM Scores at Admission and Discharge

	n	Minimum	Maximum	*M*	*SD*
Admission	28	1	8.	4.683	2.36
Discharge	28	2	8.	5.462	1.86

A conceivable reason for lack of statistical significance can be attributed to an extreme outlier that had a decline in JH-HLM score by -3 points. After omitting the outlier, the average change in JH-HLM score from admission to discharge increased, with a decrease in standard deviation (*M*=6.357, S*D*= 1.496). Using a Wilcoxon Signed Ranks test comparing JH-HLM scores at admission and discharge, the data was statistically significant (z = -2.244, p =.012).

An independent sample T-test was used to compare the effect of early mobility on average length of stay in the ICU. Patients that met inclusion criteria for the nurse driven early mobility protocol had a slightly longer length of stay in the ICU (M = 6.54 + 3.45, range 2-13) when compared to those who could not participate in early mobility (M= 5.76 + 2.87, range 2-11). This was not statistically significant, with a p-value of 0.62. The following project objectives were not met; "decrease hospital length of stay by 25%, using pre and post implementation data" and, "increase the rate of mobility in the ICU by 15% based on NDEMP compliance, using pre and post implementation data". The data can be referenced in Table 2.

Table 2
Length of Stay in the ICU

Variable	Early Mobility (N=28)	No Early Mobility (N = 16)	P Value
Total Length of ICU Stay	(M = 6.54 + 3.45, range 2-13)	(M= 5.76 + 2.87, range 2-11)	0.62

Summary and Interpretation of Results

The results of the data analysis failed to produce statistically significant results. This can be attributed to the sample size, as it was too small to detect clinically relevant differences due to inadequate statistical power. There were unsignificant findings due to data, thus it could not support or reject the hypothesis (Pye et al., 2016). With a larger sample size, results could have been statistically significant based on JH-HLM scores. According to Alaparthi et al. (2020),

patient ambulation is a fundamental component of nursing care that can set in motion high quality, evidence-based practice changes.

Although the data analysis failed to produce statistically significant results, there was a strategic trade-off on the impact of the culture in the ICU. The observed and anticipated outcomes included a change in the practice of early ambulation of ICU patients. The nursing staff in the ICU started to promote a mobility culture, leading to effective execution and sustainability of the nurse driven early mobility protocol. Hospitalized patients that are placed on bedrest orders upon admission resulting in prolonged immobilization are at a higher risk for functional decline and hospital associated complications, leading to a higher cost of care (Jones et al., 2019; Hoyer et al., 2016; Klein et al., 2018). Evidence indicates that nurse facilitated early mobility protocols enhance patient outcomes, functional status, and decrease hospital length of stay (Jones et al., 2019; Klein et al., 2018). Furthermore, early mobilization decreases mortality and readmissions rates, resulting in fiscal saving (Goldfarb et al., 2018; Hoyer et al., 2016). To produce statistically relevant results, the plan would be to conduct this project in other units at the project site, to create a larger, more diverse patient population and address other perceived barriers to care.

Limitations

Limitations of the project as it relates to bias is the generalization and stereotyping of patients in the ICU. Instead of treating patients as unique, complex individuals, generalizations can negatively impact patient care. Implicitly, all people have biases, but it’s the responsibility of the multidisciplinary team to use cultural competency to promote health outcomes. To minimize implicit bias, the intercollaborative team practiced individualized, patient-centered care during

ICU rounds to help facilitate the nurse driven early mobility protocol to plan specific goals for each patient.

One of the major limitations in the design of the quality improvement project was the sample size. The sample size of 28 patients was too small to detect clinically relevant differences due to inadequate statistical power. To minimize this limitation, eligibility criteria was re-evaluated. With a larger sample size, results could have been statistically significant based on JH-HLM scores. Additionally, an extended period of time beyond four weeks for data collection would have yielded a larger sample size, reducing the margin of error and increasing the level of confidence. A larger sample size with a prolonged period of data collection would lead to a greater power to determine between JH-HLM scores with, and without a nurse driven early mobility protocol.

Conclusion

The project's population consisted of 28 eligible patients based on inclusion criteria admitted to the ICU during implementation period of the quality improvement project. The bedside nurses assessed mobility status at admission to the ICU (baseline) and discharge (post implementation) using the JH-HLM tool. The clinical question examined whether implementation of the nurse driven early mobility protocol created by AHRQ would improve functional status and decrease hospital length of stay while in the ICU.

Implications

Research shows that mobilization of patients is a standard practice within the nursing discipline that is often neglected (Marra et al., 2017). Assessment of the host site uncovered that early mobility practices were lacking consistency, and there were no established guidelines for ICU patient mobilization in place. The AHRQ nurse-driven early mobility protocol was

implemented to provide an evidence-based solution to the lack of standardization. Several implications can be derived from the results of this project.

Practical Implications

Research has reiterated that immobility during hospitalization leads to sarcopenia, severe muscle loss, healthcare associated infections, delirium, and overall functional decline. Additional inpatient costs from prolonged immobilization attribute to over utilization of resources and increased money expenditure (Schmidt et al., 2016, Hashem et. al., 2016, Kourek et al., 2022, & Goates et al., 2019). Although the statistical analysis did not demonstrate significant results, the AHRQ nurse-driven early mobility protocol should be incorporated into daily nursing practice to reduce and prevent health-care related complications. This protocol may be beneficial in other ways that were not measured in this project, to include reduced occurrence of venous thrombi, health-care associated pneumonia, and/or pressure ulcers.

The culture of the ICU at the host site had to change in order to implement the nurse-driven early mobility protocol. Protocol change initially presented as a challenge, but the multidisciplinary team displayed resiliency and adaptability to change. Recommendations for practice include annual education for the multidisciplinary team on the benefits of early mobility and maintaining skills on proper mobility techniques.

Future Implications

Initiating this protocol in other units could potentially improve patient outcomes throughout the hospital system. Continuous quality improvement evaluation is necessary to identify the barriers and limitations of implementation. If the project were to be replicated in other units at the host site, it would be beneficial to have a larger sample size and extended data

collection period. A larger sample size may provide considerable insight into the effectiveness of the AHRQ nurse-driven early mobility protocol.

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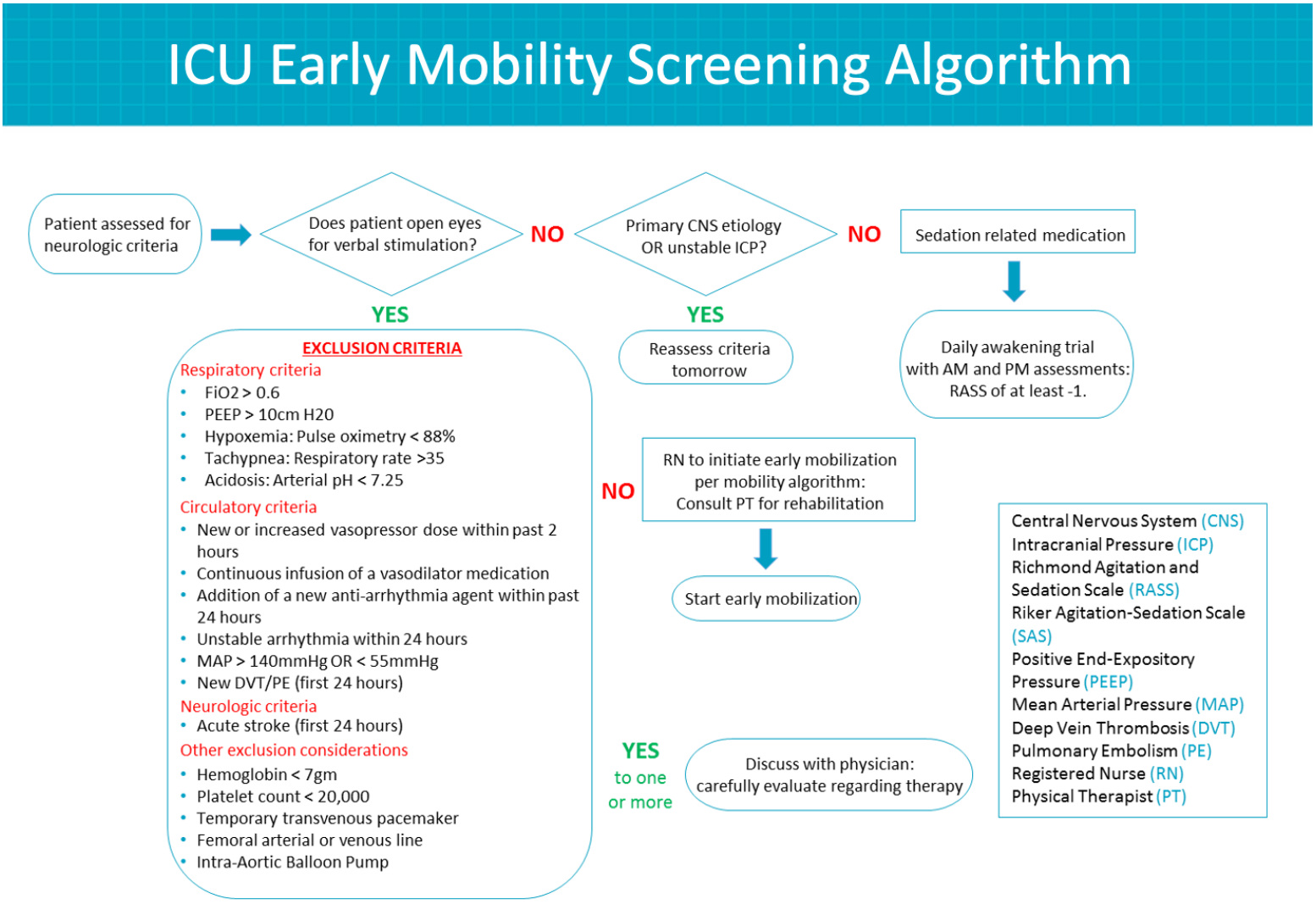
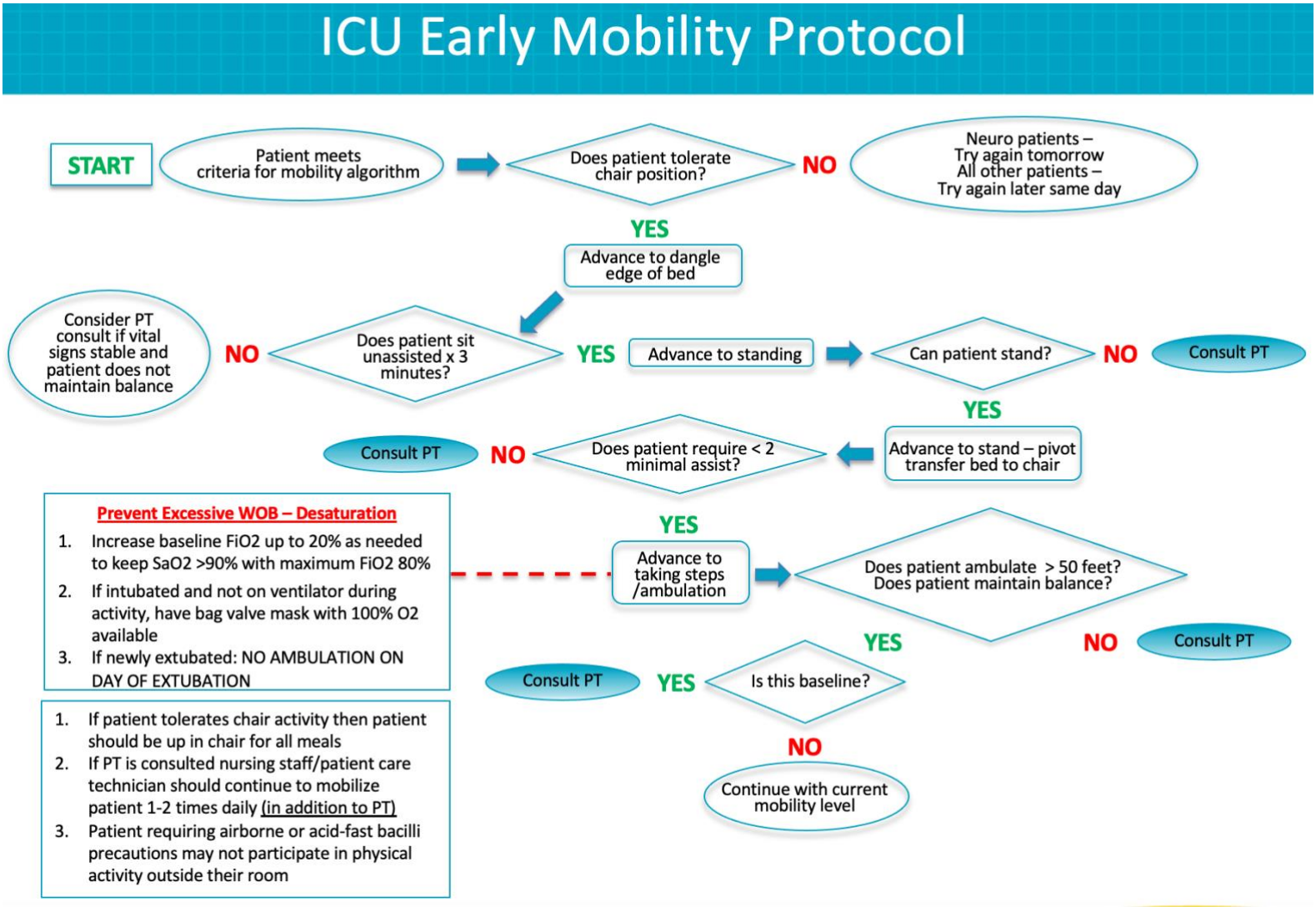
Appendix A

Task	Notes	Timeframe
Step 1 - Appraisal and Synthesis of Evidence	1. Review and critique evidence.	May-July 2022
	2. Select early mobility protocol, determine necessary tools.	August-September 2022
DNP Project Team Determination	1. Collect IRB support materials to determine submittal.	September 2022
Step 2- The Change Stage	1. Revise NDEMP if needed	September 2022
	2. Provide protocol education in various forms.	November 2022
Step 3- The Refreezing Stage	1. Begin rounding with ICU project champions utilizing rounding script.	November 2022 and ongoing
	2. Collection of data pre-implementation of NDEMP.	November 2022
	3. Examine outcomes on a weekly basis with ICU project champions.	November 2022 and ongoing
	4. Ensure resources to sustain change are in place.	November 2022
	5. Analyze data; determine impact of change in practice.	December 2022
	6. Disseminate findings.	December 2022

Appendix B


ICU Early Mobility Screening Algorithm
Patient assessed for neurologic criteria
Does patient open eyes for verbal stimulation?
NO
Primary CNS etiology OR unstable ICP?
NO
Sedation related medication
Daily awakening trial with AM and PM assessments: RASS of at least -1.
YES
Reassess criteria tomorrow
YES
EXCLUSION CRITERIA
Respiratory criteria
FiO2 > 0.6
PEEP > 10cm H20
Hypoxemia: Pulse oximetry < 88%
Tachypnea: Respiratory rate >35
Acidosis: Arterial pH < 7.25
Circulatory criteria
New or increased vasopressor dose within past 2 hours
Continuous infusion of a vasodilator medication
Addition of a new anti-arrhythmia agent within past 24 hours
Unstable arrhythmia within 24 hours
MAP > 140mmHg OR < 55mmHg
New DVT/PE (first 24 hours)
Neurologic criteria
Acute stroke (first 24 hours)
Other exclusion considerations
Hemoglobin < 7gm
Platelet count < 20,000
Temporary transvenous pacemaker
Femoral arterial or venous line
Intra-Aortic Balloon Pump
NO
RN to initiate early mobilization per mobility algorithm: Consult PT for rehabilitation
Start early mobilization
YES to one or more
Discuss with physician: carefully evaluate regarding therapy
Central Nervous System (CNS)
Intracranial Pressure (ICP)
Richmond Agitation and Sedation Scale (RASS)
Riker Agitation-Sedation Scale (SAS)
Positive End-Expository Pressure (PEEP)
Mean Arterial Pressure (MAP)
Deep Vein Thrombosis (DVT)
Pulmonary Embolism (PE)
Registered Nurse (RN)
Physical Therapist (PT)

Appendix C


ICU Early Mobility Protocol
START
Patient meets criteria for mobility algorithm
Does patient tolerate chair position?
NO
Neuro patients – Try again tomorrow
All other patients – Try again later same day
YES
Advance to dangle edge of bed
Does patient sit unassisted x 3 minutes?
NO
Consider PT consult if vital signs stable and patient does not maintain balance
YES
Advance to standing
Can patient stand?
NO
Consult PT
YES
Advance to stand – pivot transfer bed to chair
Does patient require < 2 minimal assist?
NO
Consult PT
Prevent Excessive WOB – Desaturation
1. Increase baseline FiO2 up to 20% as needed to keep SaO2 >90% with maximum FiO2 80%
2. If intubated and not on ventilator during activity, have bag valve mask with 100% O2 available
3. If newly extubated: NO AMBULATION ON DAY OF EXTUBATION
YES
Advance to taking steps /ambulation
Does patient ambulate > 50 feet? Does patient maintain balance?
NO
Consult PT
YES
Is this baseline?
YES
Consult PT
NO
Continue with current mobility level
1. If patient tolerates chair activity then patient should be up in chair for all meals
2. If PT is consulted nursing staff/patient care technician should continue to mobilize patient 1-2 times daily (in addition to PT)
3. Patient requiring airborne or acid-fast bacilli precautions may not participate in physical activity outside their room

Appendix D

Scripting for Rounding on Early Mobility Implementation

Nurse presents patient to team with following information:

> "Patient" is a _____ year old "gender", hospitalized for _____. Today is day "#" in the hospital.
>
> Day "#" on the ventilator. (If indicated)
>
> Pain score is _____.
> Current pain regimen is _____ and the last dose was received _____.
> Target RASS is _____.
> Current RASS is _____.

Currently his sedation is _____ at _rate__, or he has received so many boluses of sedation (or mg given during last shift).

Current vent settings are: _____.
(This information could be added to conversation per respiratory therapy)

Spontaneous awakening trial – contraindicated or performed?
If done, how was the tolerance?
If not, for patient on continuous sedation, was infusion re-started at 50%?

Spontaneous breathing trial – contraindicated or performed?
If SBT indicated and has been done – respiratory therapy would indicate that patient tolerated/did not tolerate SBT and why.

Early Mobility –Candidate for early mobility based on algorithm?
Has it been performed?
If not, why?
If performed, how was tolerance? What is the JH-HLM score?
What are the next steps?

Team discusses:
1. Plan for sedation and ventilation for the upcoming 24 hrs.
2. Target RASS - determine whether sedation or RASS goals need to be changed. Any changes need to be documented in the EMR.
4. Steps for early mobility, adherence to the protocol, are JH-HLM scores improving.

Appendix E

Johns Hopkins Highest Level of Mobility (JH-HLM) Scale

Background - A decline in functional status is common during acute care hospitalization. This decline can be mitigated through hospital-based early activity and mobility programs. An important component of such programs is the systematic measurement of patient mobility. We developed the Johns Hopkins Highest Level of Mobility (JH-HLM) scale to serve as a regular assessment of patient mobility.

JOHNS HOPKINS: HIGHEST LEVEL OF MOBILITY (JH-HLM) SCALE

WALK	250+ FEET	8
	25+ FEET	7
	10+ STEPS	6
STAND	1 MINUTE	5
CHAIR	TRANSFER	4
BED	SIT AT EDGE	3
	TURN SELF / ACTIVITY	2
	LYING	1

**Bed activity includes passive or active range of motion, movement of arms or legs, bed exercises (e.g., cycle ergometry, neuromuscular electrical stimulation) and dependent transfer out of bed.*

If you are uncertain on how to score certain mobility events, many questions have been clarified in the separate FAQ document.

The JH-HLM scale was developed based on input from multiple disciplines (nursing, physical and occupational therapists, physicians, etc.) for the following uses:

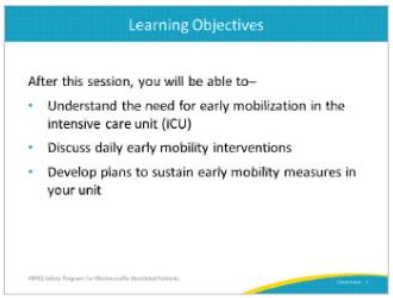
- To record the mobility that a hospitalized patient *actually* does, not what they are capable of doing. Documentation is based on observation and should reflect the highest level of mobility the patient performed since the last documentation. We recommend JH-HLM documentation twice daily, during waking hours, on all patients.
- To standardize the description of patient mobility across multi-disciplinary providers (i.e. physicians, nurses, rehabilitation therapists, support staff).
- To set individual patient mobility goals during hospitalization (e.g. move up 1 step on the scale tomorrow).
- A performance measure for quality improvement projects aimed at promoting patient mobility.

Appendix F

AHRQ Safety Program for Mechanically Ventilated Patients

Nurse-Driven Early Mobility Protocols

Facilitator Guide

Slide Title and Commentary	*Slide Number and Slide*
Title Slide **Nurse-Driven Early Mobility Protocols** **SAY:** This module will provide an overview of the interventions required for early mobility in mechanically ventilated patients and ways to establish and sustain a nurse-driven early mobility protocol.	***Slide 1*** 
Learning Objectives **SAY:** After this session, you will be able to explain why early mobilization of patients is important and be able to discuss when and how to implement daily early mobility interventions. In addition, you will learn strategies to sustain early mobility measures in your unit.	***Slide 2*** 

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Appendix G

AHRQ Safety Program for Mechanically Ventilated Patients

PREVENT HAIs Healthcare-Associated Infections

Daily Early Mobility Data Collection Tool

Hospital ID# ___________ Unit ID#___________ Date (mm/dd/yyyy) ___________

Fill out for all beds | **Fill out if patient is intubated or has tracheostomy (trached) and is mechanically ventilated (can use for patients not mechanically ventilated)**

Bed #	Intub/ Trach & Mech Vent	Date of Intubation (mm/dd/yyyy)	Sedation Scale: RASS/ SAS/ Not Used in Unit	Sedation Scale: Tar-get (If RASS – 5 to 4, NS or X, NK; If SAS – 1 to 7, NS or X, NK)	Sedation Scale: Actual	Delirium Assessment: CAM-ICU/ ASE/ ICDSC/ NU	Delirium Assessment: CAM-ICU P, N, X, UTA, NK	Delirium Assessment: ASE 0–10, X, UTA, NK	Delirium Assessment: ICDSC P, N, X, UTA, NK	Highest Level of Mobility – 0 to 8 (see daily codes on next page)	Perceived Barrier to Achieving a Higher Level of Mobility – 0 to 15 (see daily codes on next page)	PT	OT	Events (Up to Three Events) 0 to 25 (see daily codes on next page): Event 1 Required	Event 2 Only if Needed	Event 3 Only if Needed
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			
	Y N E	/ /	RASS SAS NU			C A I NU						Y N NK	Y N NK			

ASE = Attention Screening Exam; CAM-ICU = Confusion Assessment Method for the ICU; ICDSC = Intensive Care Delirium Screening Checklist; E = Empty; Intub = Intubation; Mech Vent = Mechanical Ventilation; N = Negative/No; NK = Not Known; NU = Not Used in this Unit; OT = Occupational Therapy; PT = Physical Therapy; P = Positive; RASS = Richmond Agitation and Sedation Scale; SAS = Riker Sedation-Agitation Scale; Trach = Tracheostomy; UTA = Unable to Assess; X = Not Performed; Y = Yes

Daily Codes

HIGHEST LEVEL OF MOBILITY	PERCEIVED BARRIER TO ACHIEVING A HIGHER LEVEL OF MOBILITY	EVENTS
0. Nothing: passively rolled or exercised by staff, but not actively moving (includes raising head of bed to upright position without patient participation in movement, chest physical therapy, and splinting)	**0.** Not applicable — patient at highest possible level of mobility	**0.** None
1. Transfer bed to chair without standing: hoist, passive lift, or slide to the chair without standing	**1.** Bed rest orders	**1.** Endotracheal tube dislodgement
2. Sitting in bed/exercises in bed: any activity in bed, including active rolling, bridging, active exercises, active movement from supine to sitting position, use of cycle ergometer, use of tilt table, not moving out of bed or over the edge of the bed	**2.** Patient on comfort/palliative care measures	**2.** Tracheostomy dislodgement
3. Sitting at edge of bed: actively sitting over the side of the bed with some trunk control (may be assisted)	**3.** Patient sedated (Richmond Agitation Sedation Scale [RASS] -4 or -5; or Riker Sedation-Agitation Scale [SAS] 1 or 2) and on infusion of benzodiazepine, narcotic, propofol, or other sedative	**3.** Nasal feeding tube dislodgement
4. Standing: weight bearing through feet in standing position with or without assistance; may include use of a standing lifter	**4.** Patient sedated (RASS -4 or -5; or SAS 1 or 2), but NOT on infusion of benzodiazepine, narcotic, propofol, or other sedative	**4.** Oral feeding tube dislodgement
5. Transfer from bed to chair with standing: able to step or shuffle through standing to chair; this involves actively transferring weight from one leg to another to move to chair	**5.** Medically inappropriate (orthopedic reason, i.e., fracture of long bone, spine, or pelvis)	**5.** Percutaneous feeding tube dislodgement
6. Marching in place: able to walk in place by lifting alternate feet (must be able to step at least four times, two for each foot) with or without assistance	**6.** Medically inappropriate (circulatory or respiratory reason) as delineated in the medical screening algorithm	**6.** Central venous catheter dislodgment (not femoral site), including peripherally inserted central catheter line
7. Walking: walking away from the bed/chair by at least four steps (two for each foot) assisted by a person/people or gait aid, or unassisted	**7.** Medically inappropriate (new deep vein thrombosis, or DVT) as delineated in the medical screening algorithm	**7.** Central venous catheter dislodgement (femoral site)
8. Unknown: it is unknown regarding what activity, if any, occurred	**8.** Medically inappropriate (femoral sheath) as delineated in the medical screening algorithm	**8.** Arterial catheter dislodgement (not femoral site)
	9. Medically inappropriate (for any other reason, i.e., unstable, active gastrointestinal bleeding)	**9.** Arterial catheter dislodgement (femoral site)
	10. Patient unavailable throughout the day	**10.** Dialysis catheter dislodgement (not femoral site), including tunneled or nontunneled
	11. Staffing (registered nurse, physical therapist, respiratory therapist) unavailable throughout the day	**11.** Dialysis catheter dislodgement (femoral site)
	12. Patient declined mobilization throughout the day	**12.** Pulmonary artery catheter dislodgement (not femoral)
	13. Patient is too weak to progress to higher level of mobility	**13.** Pulmonary artery catheter dislodgement (femoral site)
	14. Other barrier not listed above	**14.** Chest tube dislodgement
	15. Unknown barrier	**15.** Wound or dressing disruption or new bleeding at site
		16. Cardiac device dislodgement (i.e., temporary pacemaker wire, ventricular assist device, intra-aortic balloon pump
		17. Hypotension (change in mean arterial pressure (MAP) to <55 mmHg, or if intervention required [i.e., fluid bolus or new/increased vasopressor dose])
		18. Hypertension (change in MAP to >140 mmHg, or if intervention required)
		19. Desaturation (02 sat <85% or if intervention required [i.e., increase in Fi02])
		20. Cardiac arrest requiring cardiopulmonary resuscitation
		21. New arrhythmia (excludes sinus tachycardia, premature ventricular contractions (PVC), or pre-existing arrhythmia that did not worsen during mobilization)
		22. Fall WITH staff assisting in lowering patient
		23. Fall WITHOUT staff assisting in lowering patient
		24. Death
		25. Other

Instructions for Daily Early Mobility Data Collection Tool

Please complete this form once a day, every day. If possible, complete it around the same time each day, hopefully during patient rounds.

Patients are considered mechanically ventilated on a specific day if they were mechanically ventilated at the time of observation.

All of the contraindications are listed at the end of the data collection tool. Please print the data collection sheet with the contraindications on the back for ease of data collection.

This tool may also be used for patients who are not mechanically ventilated.*

DATA FIELD	DIRECTIONS
Hospital	Enter the name of your hospital.
ICU	Enter the name of your unit.
Date	Enter today's date as *MM/DD/YYYY format (e.g., 01/31/2014).*
Bed #	Enter all the bed numbers on the form, regardless of whether the patient is on mechanical ventilation. Include empty beds.
Intub/Trach & Mech Vent: Is the patient currently receiving mechanical ventilation?	Enter for all patients. If the bed is empty, leave blank. ***Mechanical ventilation is defined as receiving ventilator support via an endotracheal tube or tracheostomy tube.*** • Patients treated with noninvasive ventilation would be counted as **N.** • Circle **Y** if the patient is currently intubated/trached **and** mechanically ventilated. • Circle **N** if the patient is not currently intubated /trached **and** mechanically ventilated. • Circle **E** if there is no patient in the bed. ***For any specific patient, if the patient is not currently intubated/trached AND on mechanical ventilation, STOP. Do not enter any more information regarding that bed for this date.*** *If you entered Y, all of the following information is required.* *If you have entered N, the following information is not required. However, you may collect and enter this information if it would be of use to your unit.* *If you have entered E, STOP. Do not enter any more information regarding that bed for this date.*

Date of Intubation	Enter the date that the patient was intubated using an *MM/DD/YYYY format (e.g., 06/01/2012).* Evaluate daily for patients receiving full vent support. • DO NOT use dates from reintubation following self-extubation. • If the patient is reintubated following less than 24 hours after extubation, use first intubation date.