

**THE USE OF A PROGRESSIVE MOBILITY PROTOCOL TO ENHANCE  
PATIENT OUTCOMES**

by

Tiffany M. Snow

A project brief submitted to the Faculty of the University of  
Delaware in partial fulfillment of the requirements for the degree of Doctor  
of Nursing Practice

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## ABSTRACT

*Background:* Physical inactivity is associated with a wide range of medical disorders that leads to unfavorable outcomes for critically ill patients. Consequences from prolonged immobilization or constrained activity include functional deterioration, increased risk for falls, hospital acquired pressure ulcers (HAPU), ventilator duration, and length of stay (LOS). *Local Problem:* Despite the supporting evidence of early mobility, many nursing units are unsuccessful in integrating early mobility practices into patients' daily schedules. *Intervention:* The purpose of the performance improvement project was to increase mobilization and prevent functional decline and hospital-associated complications. A standardized early mobility protocol was developed and implemented with an organized evaluation of an individual's mobility status. The protocol encompasses progressive mobilization and ambulation with the progression based on a patient's functional capability and ability to tolerate the prescribed activity. The protocol was divided into 4 levels. Each level includes guidelines on positioning, therapeutic exercises, transfers, walking reeducation, and duration and frequency of mobility sessions. Additionally, the criteria for progressing to the next phase was provided. *Results:* Results demonstrated a reduction in ICU LOS (-0.17 days), overall LOS (-0.49 days), ventilator duration (-0.13 days). The prevalence of HAPU(s) reduced by one case and VTEs reduced by two cases. All results were not statistically significant, but had

significant, positive clinical and financial implications for the organization. *Conclusion:* Implementing evidence-based early mobilization strategies as a routine part of care provides innumerable opportunities to improve health and outcomes in the surgical critical care and transitional surgical care patient population.

*Keywords: early mobilization, mobilization protocol, early mobility protocol, early ambulation, early activity.*

## **Chapter 1**

### **INTRODUCTION**

#### **1.1 Problem Statement**

As healthcare regulations are shifting, clinicians are diligently working to address the complexities in healthcare and enhance the care of hospitalized critically ill patients (Azuh et al., 2016; Moyer et al., 2017; Zomorodi, Topley, & McAnaw, 2012). In the adult, critically ill population, intrinsic risk factors, including vascular disease, respiratory disease requiring mechanical ventilation, infection, age, length of stay, decreased tissue perfusion, poor nutritional status, impaired sensory perception, vasopressor medication use, and dialysis increase the risk for these individuals to become deconditioned and develop functional decline (Zomorodi, Topley, & McAnaw, 2012). In addition to the intrinsic and extrinsic comorbid factors, critically ill patients may have acute conditions that place them at a further increased risk for decreased mobility (Azuh et al., 2016; Drolet et al., 2013). One of the key facilitators to reduce morbidity and mortality in the critically ill patient population is early mobility (Clark et al., 2013; Drolet et al., 2013). Profound adverse effects may result from decreased mobility or inactivity, which include declination of the skeletal muscle, skin, pulmonary and cardiovascular systems, and the brain; subsequently, immobility leads to accelerated muscle atrophy, malnutrition, dehydration, incontinence, skin

deterioration, delirium, and functional decline (Azuh et al., 2016; Drolet et al., 2013; Zomorodi, Topley, & McAnaw, 2012). Weakness is directly correlated among patients who require mechanical ventilation and surgical critical care admissions, which entails longer lengths of stay and extending rehabilitation due to functional decline. Individuals who are critically ill, on bed rest and/or immobile decondition at a rate of 1% to 1.5% per day and lose approximately 50% of muscle mass in a short period of two weeks (Clark et al., 2013).

## **1.2 Background and Significance**

Complications resulting from a decreased mobility status considerably impacts nurse-sensitive outcomes, such as falls, hospital-acquired pressure ulcers (HAPUs), and delirium. HAPUs, falls, and delirium lead to worsening deterioration for the patient, which results in longer length of stay and increased healthcare costs, morbidity and mortality rates, nursing home placements, and increased readmission rates (Atkins & Kautz, 2015; Azuh et al., 2016; Campbell, Fisher, Anderson, & Kreppel, 2015). Thus, it is essential for clinicians to focus their efforts on developing mobility intervention protocols and slow or prevent functional deterioration to optimize patient and nurse-sensitive indicators. Apart from spontaneous breathing trials and daily wakeups, early mobilization of surgical critical care patients has been shown to be an effective intervention to promote enhanced functional status, increased recovery time, decreased length of stay, and positive patient outcomes (Drolet et al., 2013; Moyer et al., 2017; Zomorodi, Topley, & McAnaw, 2012). Research suggests that surgical critical care and transitional critical care patients participate in brief, infrequent

therapeutic activities (e.g. passive range of motion, ambulation) and the utilization of a standardized mobility protocol warrants that adequate and therapeutic activity is being performed (Atkins & Kautz, 2015; Moyer et al., 2017; Lord et al., 2013).

A standardized early mobility protocol would provide consistency and maximize patient's readiness to participate in therapeutic activities with his/her nurse at a standard time as indicated by the protocol. Mobility protocols are designed to promote or maintain the individual's baseline mobility status by including a series of detailed mobility interventions implemented by nurses in a progressive approach (from admission to discharge). Studies suggest that critically ill patients report an increase in difficulties with energy, pain, respiratory status, and mobility status in relation to their functional status (Lord et al., 2013; Moyer et al., 2017; Zomorodi, Topley, & McAnaw, 2012).

Early mobilization (e.g. passive range-of-motion, ambulation) should begin within 24 hours of admission to the intensive care unit, Surgical Critical Care Complex (SCCC), and Transitional Surgical Unit (TSU), depending upon the physical capabilities and hemodynamic stability of the patient (Lord et al., 2013; Moyer et al, 2017). There are recognized beneficial impacts of early mobilization in surgical, stroke, and cardiovascular patient populations (Clark et al., 2013; Drolet et al., 2013). Individuals, who performed early ambulation exercises, had a significant reduction in lower leg edema, exhibited lower pain scores, and reported less pain during walking (Drolet et al., 2013). A standardized early mobilization protocol improves the patient's wellbeing by supporting the functional well-being of individuals and preventing hospital-associated

difficulties by maintaining and/or improving functional condition from admission to discharge (Azuh et al., 2017; Clark et al., 2013; Lord et al., 2013).

### **1.3 Project Purpose**

Mobility practices within the SCCC and TSU were inconsistent and required an out of bed order from a provider for nurses to perform mobility practices. Generally, all patients in both units were turned every two hours and only out of bed to the chair if intubated. Patients were ambulated and passive range of motion was performed infrequently and randomly. The Physical and Occupational Therapists were available to assist, but only during weekdays (Monday through Friday) from 0800 to 1630. Additionally, when patients were mobilized, they were unable to endure much activity, because they were weak and deconditioned due to spending a considerable amount of time in bed. Consequently, nursing staff became discouraged and fearful that the patient might fall; therefore, further attempts to mobilize patients were significantly delayed and inconsistent. The expectation of the nursing staff was to sustain each patient's quality of life and assist in returning individuals to maximum potential, therefore enforcing and educating early mobility as a necessity. Furthermore, it was essential to evaluate and document the effect of a standardized early mobilization program on patient outcomes and nursing-sensitive indicators to establish evidence-based practices within the SCCC and TSU.

### **1.3 PICOTS Question**

The PICOTS question is as follows: What are the effects of a nurse-driven progressive mobility protocol (I) on ICU and overall length of stay, ventilator

duration, hospital acquired pressure ulcers, and venous thromboembolisms outcomes (O) in the post-operative surgical adult population (P) of a Surgical Critical Care Unit and a Transitional Surgical Care Unit (S) in an eight-week period (T)?

#### **1.4 Theoretical Framework**

Health promotion programs produce maximum positive impact when they are supported by a clear understanding of the investigated health performances and their environment. A theoretical framework provides a methodical perspective of identifying events and situations that guide the evidenced-based practice (EPB) study. Additionally, a theoretical framework provides a groundwork of concepts that define, explain, or predict various events through the evidence of affiliations between the variables in the EBP study. Finally, theoretical frameworks allow for integration of the best evidence combined with patient preferences, clinical skills, and available resources to create practice change (Melnik & Fineout-Overholt, 2015). This chapter includes the use of a conceptual model for EBP change.

The Lewin model considers that driving forces facilitate transformation because they push followers in the desired direction (Lewin, 1947). Change is crucial to success associated with the culture transformation into action. The Kurt Lewin's change model embraces three different phases known as *unfreezing*, *moving* and *refreezing*. The *unfreezing* stage is about assessing readiness and convincing people toward motivation for change (Lewin, 1947).

The *unfreezing stage* of the early mobility initiative is the driving force of team empowerment and distinguished determinant of needed actions. Staff motivation was the key to behavioral change in respect of attitude and positive culture transformation. This stage opened an opportunity to elevate awareness of gaps in practice through the communication to the frontline staff to embrace new ways of practice (Lewin, 1947).

The second, *moving stage* is an implementation stage that will shift the project into a new paradigm. This stage allowed the nurses to achieve new behaviors, values, and attitudes through educational sessions to address evidence-based guidelines for early mobility (Lewin, 1947).

The last, *refreezing stage* occurred after the change has been implemented. According to Lewin, the final step in the platform of changing behavior is an integration of new values to stabilize the new equilibrium emerging from the modification by supporting both the driving and restraining forces (Lewin, 1947). The purpose of the refreezing stage for participating nursing team is well fitted to demonstrate the integration of an efficient nurse-led early mobility practice as the nurses will practice sustainability with new attitudes and behavior. To sustain change, the Project Leader participated in daily unit huddles, bedside coaching, and interdisciplinary rounds.

## **Chapter 2**

### **REVIEW OF LITERATURE**

#### **2.1 Search**

A comprehensive literature search was conducted using the following search engines: (1) Cumulative Index to Nursing and Allied Health Literature (CINAHL), (2) U.S. National Library of Medicine National Institutes of Health (PubMed), and (3) U.S. National Library of Medicine (MEDLINE). Limits applied to the search included dates from 2013 to 2018; English language, and adult human subjects. Inclusion criteria included quantitative studies on critically ill patients in the intensive care unit (ICU) and/or step-down unit that were mobilized with a protocol or bundled approach. Researchers found that mobility strategies independent of a protocol were excluded. Search terms used for this review included: (1) mobility protocol in ICU, (2) early mobility protocol in ICU (3) early ambulation protocol in ICU. (4) Progressive activity protocol in ICU; and (5) ABCDE bundle. Boolean phrases included (1) progressive mobility protocol and ICU patients; (2) early mobility protocol and ICU patients; (3) early ambulation and ICU patients; (4) early activity protocol and ICU patients; and (5) physical therapy and ICU patients. Specific quantitative methodologies were evaluated for this review.

## 2.2 Review and Synthesis

After conducting a literature review, seven relevant articles were chosen to support the Progressive Mobility project conducted by the Project Leader (Appendix A). The articles included two randomized control trials (RCTs) that are considered a rating level of B on the hierarchy of evidence levels (Stolbrink et al., 2014; Zomorodi, Topley, & McAnaw, 2012). Additionally, 3 Prospective observational studies (Azuh et al., 2016; Klein, Mulkey, Bena, & Albert, 2015; Winklemen et al., 2013) and 2 retrospective observational studies were included, which are considered a rating of level C rating on the hierarchy of evidence levels (Clark, Lowman, Griffin, Matthews, & Reiff, 2013; Sigler et al., 2016).

Azuh et al. (2016) conducted prospective cohort study that implemented an early mobility protocol on over 3,233 patients in a medical ICU at a large level 1 trauma center. The goal of the study was to measure the effectiveness of an early mobility protocol facilitated by bedside nurses and supported by unit leaders, a physician, and physical therapy staff. The study revealed a significant decrease in LOS by one day, decreased hospital readmission rate (17.1% to 11.5%;  $p < 0.05$ ), and a reduction in unit acquired pressure ulcer rate (8.2 to 6.1).

Clark et al. (2013) conducted a retrospective cohort study and reviewed data on 2,176 patients in a 28-bed trauma burn intensive care unit. One group of patients ( $n = 1,132$ ) participated in a pre-early mobility program and the other group ( $n = 1,132$ ) participated in a post-early mobility program facilitated by nursing staff and nursing leadership. Study results indicated that early mobilization reduced complications associated with ICU admissions. There was a

statistically significant reduction in ventilator associated pneumonia (VAP) rates (1.5 to 0.9;  $p < 0.05$ ), deep vein thromboses (DVT) rates (0.9-0.3), and LOS was reduced by one day. This study also revealed that mobilizing intubated patients is safe and no adverse events occurred (Clark et al. 2013).

Klein et al. (2015) conducted a prospective pre-and-post intervention study in a 22-bed neurological intensive care unit (NCCU) at 1200-bed academic hospital. Researchers compared the pre-intervention group ( $n = 377$ ) who received no intervention and the post-intervention group ( $n = 293$ ) who participated in the nurse-driven mobility protocol. This early mobility protocol, included walking three times a day within 24 hours of admission. Results from this study indicated that patients who were included in the post-intervention group showed statistically significant maximum mobility status, reduced length of stay (0.5 days), and reduced mortality rates (0.9 to 0.4;  $p < 0.05$ ). Also, more patients returned to baseline mobility status and were discharged home rather than rehabilitation centers or skilled nursing homes (Klein et al. 2015).

Sigler et al. (2016) conducted retrospective evaluation study patients ( $n = 76$ ) in the Medical Intensive Care Unit (MICU) at a university medical center in Texas. The study revealed statistically significant results after implementation of an early mobility protocol facilitated by nursing and physician leadership. The average length of stay for patients requiring mechanical ventilation decreased from 4.8 to 4.1 days ( $p < 0.05$ ), reduced VAP rates (1.6 to 0.5;  $p < 0.05$ ); and reduced HAPU rate (2.2 to 1.3;  $p < 0.05$ ).

A randomized control study conducted in Birmingham community hospital of patients (n = 333) admitted to the ICU, discovered an early mobility bundle carried out by nursing staff is an effective process to increase activity and reduce the incidence of HAPUs (Stolbrink et al., 2015). Activity levels were significantly higher ( $p < 0.05$ ) and HAPU rates were significantly lower ( $p < 0.05$ ). HAPU occurrence was significantly lower in the intervention group, indicating 25 fewer cases ( $P < 0.05$ ). Additionally, results indicated that LOS decreased by 1.5 days (Stolbrink et al., 2015).

Winkleman et al. (2013) conducted a prospective review study in a medical and surgical ICU in a large urban academic medical center to assess the efficacy of a nurse-led early mobility protocol to increase mobilization within first 24-48 hours of hospital admission. The study intervention group (n = 220) with noted increased functioning and reduced deconditioning during their admission in the ICUs. Additionally, delirium rate was reduced from 2.2 to 0.5 ( $p < 0.001$ ), VAP rate was reduced from 1.2 to 0.9 ( $p < 0.05$ ), and LOS was decreased by 1 day. The study also revealed that no adverse events occurred due to the mobility protocol (Winkleman et al., 2013).

A randomized control study conducted in a 16-bed Surgical ICU at large academic hospital in the southeastern portion of the United States demonstrated statistically significant results as well. Compared to the control group (n = 55), the treatment group (n = 49) demonstrated an increase in functional status after the implementation of a nurse-driven mobility protocol (59% versus 35%;  $p < 0.05$ ) (Zomorodi, Topley, & McAnaw, 2012). Additionally, there was reduced

incidence of delirium (28% versus 41%;  $p < 0.001$ ). Finally, the researchers found that earlier removal of endotracheal tubes and more ventilator free days for patients.

### **2.3 Literature Gaps**

There is sufficient evidence supporting the benefits of an early mobility protocol implementation. Studies revealed many valuable quality and clinical improvements for the critically ill patient population in various intensive care units (Jolley et al., 2016; Schaller et al., 2016; Sigler et al., 2016). Unfortunately, many providers still support bedrest for patients in the ICU (Jolley et al., 2016). Research studies indicate that approximately 15% of critically ill, mechanically ventilated patients are only able to sit on the edge of the bed or remain in a chair for short periods of time (Winkelman et al., 2013). The intervention of early mobilization of critically ill patients is an increasingly utilized practice showing improvements in clinical outcomes. Evidence supporting patient outcomes on long-term effects of ICU-acquired weakness is still limited due to the shift of mentality in practitioners surrounding early mobility of patients in the ICU (Jolley et al., 2016). Many providers including nurses, advanced practice nurses, and physicians hesitate to adopt new early mobilization practices due to scarcity of evidence regarding fear of harm to the patient from artificial airway dislodgment to hemodynamic instabilities (Azuh et al., 2016; Campbell et al., 2015). Based on this evidence, there is a necessity to conduct studies to close the gap between practice and research. To accomplish this, a culture of early mobility must be promoted, along with a dedication from intensive care providers to stimulate

change in mobility practice patterns and advocate for leadership that commits to sustaining that change (Jolley et al., 2016).

### **2.3 Project Implications**

Recommendations for nursing practice correlate to the PICOTS question and positive patient outcomes. Early mobilization of the post-operative critically ill patient is often neglected by clinicians and nursing staff (Lord et al., 2013; Moyer et al., 2016). This review of literature evaluation suggests that adherence to an early mobilization protocol, involving a multidisciplinary team, will improve post-operative patient outcomes by reducing nursing sensitive outcomes (e.g. VAP, HAPU), reducing LOS in the ICU and the overall LOS, as well as reduced readmission rates (Azuh et al., 2016; Klein et al., 2015; Moyer et al., 2016). The development of an early mobilization protocol and inclusion of a multidisciplinary team, including management, physicians, physical therapists and bedside nursing, will ensure sustainability that demonstrates both positive quality and fiscal outcomes (Jolley et al., 2016; Schaller et al., 2016). There is a multitude of research studies that indicate the benefits of early mobilization protocols in the medical-surgical patient in the acute care setting; however, there is little research based on post-operative ICU and/or post-operative stepdown patient populations (Azuh et al., 2016; Clark et al., 2103; Sigler et al., 2016). Recommendations of studies with larger sample sizes to investigate the accuracy of the literature reviewed are necessary as well (Clark et al., 2013).

To effectively implement change, it is necessary to involve key stakeholders from initiation to ensure staff nurses are knowledgeable about

mobility needs in the ICU (American Association of Critical Care Nursing, 2017). Research suggests that additional efforts are necessary to further improve staff adherence to the mobility protocol (Drolet et al., 2013; Moyer et al., 2017). Unit leaders and champions must be present to assist with the identification of knowledge gaps and identify unit and patient outcome goals. To ensure all the components of the mobility protocol are being address, regular spot compliance checks by unit leaders were essential. Additionally, nursing quality measures must be reviewed to monitor quality metrics and patient safety outcomes during the implementation process of the mobility protocol (Moyer et al., 2017). Finally, studies suggest leadership staff involved in the implementation process should celebrate successes associated with the mobility protocol (Drolet et al., 2013).

The implications of this project include exposing both the group facilitator and clients to mindfulness exercises and the benefits of mindfulness. Clients were able to use the mindfulness techniques both within the structured environment of the community-based MAT program and in their daily lives. Mindfulness is another tool that the MAT program can provide for clients to use to help them cope with difficult and stressful situations, as well as to decrease relapse rates and cravings for drugs and alcohol. Mindfulness exercises are easy to implement, essentially at no cost, and require minimal resources. This treatment option can be incorporated into group and individual therapies. Incorporating mindfulness exercises into a weekly SUD group can aid in decreasing relapse rates and severity and give clients skills that can be used in everyday life, such as being present in the moment and not judging their own thoughts.

## **2.4 Project Rationale**

As federal and healthcare agencies are directed toward the quality of patient outcomes in acute care settings, the utilization of an evidence-based, nurse-driven early mobility protocol to prevent or reduce hospital associated complications is essential (Campbell et al., 2015). Prolonged immobility has the potential to be disadvantageous to all patients in the acute care setting (Clark et al., 2013). An early mobility protocol driven by nurses is one solution to provide positive outcomes and reduce avoidable causes of patient harm for critical care, medical, and surgical patient populations (Moyer et al., 2017; Zomorodi, Topley, & McAnaw, 2012). Due to the increase in morbidity and mortality rates, healthcare costs, and length of stay, hospital systems in the United States have been urged to include mobility protocols in nursing practice policies. Finally, the potential to reduce delirium, HAPUs, falls, and LOS incidences in the SCCC and TSU, is plausible with a collaborative healthcare approach of employing an innovative evidence-based mobility protocol (Bassett et al., 2012; Campbell et al., 2015; Drolet et al., 2013; Lord et al., 2013; Zomorodi, Topley, & McAnaw, 2012).

## **Chapter 3**

### **METHODOLOGY**

#### **3.1 Setting**

This project took place within Christiana Care Health System (CCHS) which is a 1,100 bed, not for profit, nonsectarian, large-scale teaching health system. This is a level 1 trauma facility that is located in Newark, Delaware. In order to ensure that progressive mobility strategy initiatives are optimal, a nurse driven unit is essential for early identification of high-risk patients (Barker et al., 2012; Winkelman et al., 2013). In the adult, critically ill population, intrinsic factors such as vascular compromise, respiratory compromise requiring mechanical ventilation, infection, age, length of stay, decreased tissue perfusion, poor nutritional status, impaired sensory perception, vasopressor medication use, and dialysis increase the risk for these individuals to become deconditioned and develop functional decline (Wieske, Dettling-Ihnenfeldt, & Verhamme, 2015; Zomorodi et al., 2013). Therefore, the most appropriate setting to conduct a nurse-driven progressive mobility project would be the Surgical Critical Care Complex (SCCC) and Transitional Surgical Unit (TSU), where the severely debilitated patients experience the intrinsic factors mentioned above and are at greatest risk for decreased mobility due to trauma-related events and/or surgical interventions

(Barker et al., 2012; Parker, Sricharoenchai, & Needham, 2013; Wieske et al., 2015).

The SCCC is a high-acuity, bedside telemetry, Intensive Care Unit (ICU) and consists of 22-bed with a 1:2 nurse to patient ratio, and a 1:6 patient care technician to patient ratio. Additionally, this unit is staffed with a dedicated respiratory therapist 24 hours a day. The SCCC encompasses patients needing intensive or invasive monitoring, which includes support of airway, stabilizing acute or life-threatening medical problems, and comprehensive management of illness and/or injury within an interdisciplinary and collaborative environment. The scope of services in SCCC incorporates a variety of surgical diagnoses including, but not limited to trauma, thoracic, general surgery, vascular, neurosurgical, urological, and pediatric. The medicine staff consists of one fourth-year resident, a critical care fellow and six critical care attending physicians. The most common patients admitted to the SCCC are diagnosed with traumatic spinal and cranium injuries, gastrointestinal surgery, neurological diagnoses, and pneumonia.

The TSU is a 12-bed high-acuity, bedside telemetry, Progressive Care Unit with a 2-3:1 patient to nurse ratio. The staff in the TSU care for a diverse surgical patient population, and a Surgical Physician Director oversees the unit which is supported by a Surgical Physician Director. The majority of the patients have traumatic injuries due to motor vehicle collisions, motorcycle collisions, falls, gunshot wounds, and other types of assaults. The trauma patients admitted to TSU tend to be labile with multisystem injuries. The surgical population

consists of complex surgical patients with high comorbidities who are unstable after surgery and require close monitoring, such as patients with ventral hernia repairs with abdominal wall reconstruction and muscle component separation, and kidney transplants.

### **3.2 Participants**

Participant inclusion and exclusion criteria for the progressive mobility protocol was identical for both nursing units. Participants included in the progressive mobility protocol must be at a mentation level that allows for interaction with staff (alert & oriented to time, place, person). According to the American Association of Critical Care Nurses (AACN, 2017), patients must be physiologically stable (no respiratory or cardiovascular instability) Exclusion criteria included: 1) patients with comfort care (medical care at end of life); 2) cardiovascular or respiratory instability requiring pharmacological support (e.g. vasopressor); 3) unstable neurologic disease with active intracranial pressure monitoring (traumatic brain injury/increased intracranial pressure); 4) unstable fractures (due to increased bleeding), and/or 5) an existing femoral sheath (due to increased risk of bleeding). Patients participated in the protocol if there were no absolute contraindications and the bedside nurse reassessed patients who did not meet criteria every eight hours for eligibility.

### **3.3 Plan and Procedures**

After a comprehensive review of evidence-based literature, the DNP Project student and Project Leader decided to utilize the AACN (2017) roadmap for implementing change to employ a progressive mobility protocol in the SCCC

and TSU at CCHS. The DNP Project Leader coordinated an interdisciplinary team meeting with the key stakeholders to obtain approval for the progressive mobility project. Key stakeholders from both patient areas included the medical director, which is the same for both units, clinical nurse specialists (CNSs), and unit managers (Appendix B). The key stakeholders were very supportive of the project, since there was no formal mobility protocol or standardized mobilization practices within the two units. Bringing together this interprofessional group was necessary to assist in developing the education for staff nurses, patient care techs (PCTs), residents, physicians, and respiratory therapists. Additionally, these key stakeholders were critical to the success of implementing the progressive mobility protocol due to the possibility of mobilizing patients on mechanical ventilation in the ICU and supportive resources for implementation of the protocol.

The evidence-based progressive mobility protocol was presented at the interdisciplinary team meeting and the group of key stakeholders were able to review the project plan and the protocol. During the interdisciplinary meeting, there were discussions surrounding the barriers associated with mobility and the need for a standardized approach to encourage early mobility in the critically ill patient population. Additionally, several drafts of the protocol were created to coincide with Medical Director's suggestions based off of additional studies and culture of SCCC. The Medical Director created an inclusion criteria recommendation that deviated from the AACN's (2017) recommendation for respiratory limitations. The inclusion criteria was changed to a positive end-expiratory pressure (PEEP) parameter of < 10 cm H<sub>2</sub>O, instead of <12 cm H<sub>2</sub>O to

initiate the progressive mobility protocol, due to the higher acuity of patients in the SCCC. It was necessary to reduce the PEEP limits to ensure respiratory safety of patients to implement early mobility (Lee et al., 2015; Wang et al., 2014). The interdisciplinary team of key stakeholders met a total of three times before a finalized version of the protocol was produced and an implementation plan was formalized. The team collectively decided to require that the protocol be a standing order in both units. Therefore, the Project Leader contacted the information technology (IT) department to assist with integrating the protocol into the electronic medical records. With the assistance from the IT department, the “Progressive Mobility Protocol” was embedded into the clinician standard of care order sets for SCCC and TSU. Instituting the protocol in the form of a standing order eliminated the possibility that the protocol could be inadvertently not ordered or implemented. Additionally, with the assistance of the IT department, the nurses had the ability electronically document the mobility activities, which allowed the project leader to monitor during the implementation phase. Finally, the project leader, with the assistance of DNP Project mentors, drafted the project for the International Review Board (IRB) approval from the organization (Appendix C). Once the IRB and key stakeholders approved the project, the project leader was able to start planning for education and roll out of the project on both units.

After IRB approval, the project leader developed a structured educational PowerPoint and emailed it to key stakeholders for feedback, edits, and approval. The education program consisted of the importance and evidence behind a

progressive mobility protocol, assessment of patients for inclusion in the protocol, and actual implementation of the protocol if appropriate. Educational objectives for the mobility protocol included: (1) assessment; (2) plan of care; (3) progressive mobility protocol; and (4) collaboration with the interdisciplinary team based on gaps in practices. As an expert on early mobility, the project leader initially delivered educational sessions to the RNIII's, which are advanced nurses and considered informal leaders on both units. The purpose to have early RNIII involvement was to gain support and assist with identifying barriers to education and protocol. Additional educational sessions were delivered to staff nurses at two different staff meetings, one in the morning and one in the evening. The project leader allowed 15 minutes for questions and required that each nurse and PCT sign off that they understood the education. The project leader ensured that all nurses and PCTs on both units received education by having the RNIII's deliver one-on-one education sessions for the nurses and PCTs that were unable to attend staff meetings before the initiation of the project. Using the same PowerPoint, the medical director delivered this education to the residents, physicians, and respiratory therapist via email, so that these individuals were aware of the nurse-driven mobility protocol. Additionally, the medical director was available during the first 2 weeks of the progressive mobility protocol implementation to answer questions and to reinforce the protocol.

### **3.4 Implementation**

After 24 hours of admission to the SCCC and TSU, the progressive mobility protocol was initiated as a standardized order embedded in CCHS

electronic Medical records. The protocol was designed to promote progressive mobility three times a day. Research suggests that for proper patient healing, it is crucial that patients rest at night (AACN, 2017). Therefore, the protocol was implemented a total of three times throughout the day and evening hours. The exact timing of the mobility was determined by the nurse caring for the patient which further promoted nursing management of the mobility, while supporting the individual needs of each patient. Additionally, the protocol provided continuity of mobility care for patients as they transferred to units with different levels of care (Appendix D) (AACN, 2017). The protocol was broken down into different phases of mobility, each with descriptive factors to assist staff in determining the appropriate phase for each patient. The protocol was comprised of four activity events, which was implemented by a nurse or delegated to a PCT. The activities were numbered as levels from 1-4 and were expected to be completed three times a day (TID): level 1 passive range of motion, turn every two hours, and continuous lateral rotation; level 2 bed in chair position, out of bed to the chair via sling; level 3 stand at side of bed with a staff member, weight shift, single-leg march, lateral steps along length of bed and assist to the chair with a staff member; level 4 walk 100 feet or more with assistance of staff.

Successful progression from one step to another was dependent on the patient exhibiting no respiratory or cardiovascular compromise for at least 60 minutes at each level as assessed by the bedside nurse. Respiratory compromise included increased work load of breathing, fatigue, shortness of breath, or increased respiratory rate. Symptoms of a cardiovascular compromise included

increased or decreased heart rate or blood pressure, a change in cardiac rhythm, or the development of chest pain. Patients who exhibited respiratory or cardiovascular compromise during the progressive mobility protocol were returned to the previous level tolerated. A complete assessment was completed by the RN and the physician was notified if the patient required any interventions (AACN, 2017).

Prior to progressing to level 3 or mobilizing the patient, a staff member must perform an Egress Test<sup>®</sup> (Appendix E), which is a standardized, evidenced-based mobility assessment and protocol (Christiana Care Health System, 2010). The Egress<sup>®</sup> Test consists of three steps: (1) three reps of sit to stand; (2) three steps of marching in place (utilize any baseline assistive devices); (3) advance step and return each foot. After the patient successfully performed all three steps of the Egress<sup>®</sup> Test, the patient was deemed safe to ambulate with a staff member present using a gait belt.

During daily interdisciplinary rounds, the project leader ensured that clinicians discussed the progressive mobility protocol use with the nurses and other healthcare professionals who were directly involved in the patient's care. Additionally, unit huddles were facilitated by the project leader, in collaboration with RNIIIs, on a daily basis to reinforce the importance of the early mobility protocol, as well as, to answer any questions by the nursing staff in order to assist in the daily utilization of the protocol on the patients in the unit. The RNIIIs and CNSs were involved in daily rounds and assisted the nurses at patients' bedside through the bedside coaching sessions to reemphasize the patient mobility

protocol, evaluate the effectiveness of nurse-patient interaction, and improve the nurses' expertise on the early mobility assessment. Bedside teaching of the protocol and clinical support for the nursing staff were essential. This approach allowed the nurse to assess their patient and initiate the protocol immediately after education. Support at the bedside promoted meaningful application to practice. Furthermore, a laminated copy of the progressive mobility protocol was placed at each bedside to further promote immediate accessibility during patient care.

The project leader completed daily assessments of mobility protocol compliance during the first 2 weeks after protocol implementation. The assessment involved the review of each patient in the ICU for protocol eligibility and assessment of whether the protocol had been implemented. Nurses who had successfully implemented the protocol were commended and a discussion ensued regarding their comfort with the mobility protocol and any questions they had were answered. Nurses who had not implemented the protocol were re-educated as to the risks of immobility and the assessment of their patients for inclusion was completed together.

### **3.5 Ethical Implications Management**

The project leader ensured that project participants were exposed to minimal risks in relation to any benefits that might result from the progressive mobility project as the project was reviewed and approved by both the Christiana Care Health Services' and University of Delaware's institutional review board (IRB). Each stage of implementation was completed without risk to patients, family, students or staff. Patient information required to participate in the

project was utilized and remained confidential in accord with the Health Insurance Portability and Accountability Act (HIPAA). All information obtained from medical records was deleted of identifiable information. The activity was conducted to access, analyze and critique a new standard of practice for mobility in the acute care setting.

### **3.6 Data Collection Techniques**

A retrospective review of Christiana's Care's electronic medical records (Cerner's PowerChart) was conducted for adult patients (age >18) admitted to the SCCC and TSU between September 1, 2017-November 30, 2017. This time frame was considered the pre-implementation as it was the same period of time from the previous year of the project implementation. The retrospective data were compared to September 1, 2018- November 30, 2018 data collection (project implementation).

The review only included adult patients (age >18), due to the demographics of the units. The nature of the protocol is to be applicable to every patient in the ICU and TSU; therefore, all admitted adult patient medical records were included for review during the selected timeframes. No identifiable staff information was collected during the review in order to maintain staff confidentiality. Finally, patients who participate in the project remained confidential as reports were examined by one master list with medical record numbers transformed into unique identifiers assigned by the REDCap platform. The project leader transferred all information from the CCHS Electronic Medical Record data configuration to REDCap platform to further maintain

confidentiality. Variables collected were SCCC/TSU admit and discharge date and time, hospital admit and discharge date and time, intubation date and time, extubation date and time, VTE, and HAPU events, and whether or not the early mobility protocol was ordered and implemented. Additionally, demographic information collected included patients' date of birth and gender.

Data were collected at sessions one, four, and eight in the form of paper-based participant questionnaires (see Appendix D-H). All clients who attended the group were eligible for participation. The questionnaires were distributed to the clients while they waited for the group to begin. Baseline questionnaires were completed prior to the first mindfulness exercise. Data collection and mindfulness implementation occurred during the fall and early winter of 2018 for eight weeks. The participants were handed questionnaires as they entered the group. When the questionnaire was handed back to the project leader, the project leader used the participant key to place participant numbers on the top of the set of questionnaires.

### **3.7 Data Analysis and Evaluation Strategies**

The project leader used IBM SPSS Statistics (version 25) and entered the data set created to assist with data extraction. Measures of adherence to the progressive mobility protocol included the presence of activity orders written by each trauma physician, documentation of activity level or phase according to the protocol, and documented patient activities. Measured outcomes that were evaluated included ICU and overall length of stay, mechanical ventilation duration (in days), pressure ulcer prevalence, and deep vein thrombosis (DVT)

events. Descriptive statistics examined average length of stay for ICU and overall hospital length of stay as well as mechanical ventilation duration for both the retrospective comparison and protocol groups.

Data were analyzed for assumptions of normality to determine parametric or non-parametric statistical analysis of retrospective and protocol data. The pre and post implementation groups were uneven. Also, a few outliers in the retrospective and protocol data yielded non-normalized data with elevated skewness and kurtosis levels. Therefore, the data did not meet the assumptions of an independent sample t-test. The project lead used the Mann-Whitney U test, which is a non-parametric alternative test to the independent sample t-test. Usually, the Mann-Whitney U test is used when the data is ordinal or when the assumptions of the t-test are not met. Using the Mann-Whitney U, the project lead analyzed the mean differences between the retrospective and protocol data for ICU and overall hospital length of stay and ventilator duration. Statistical significance was determined a priori as p-value of 0.5 for Section IV. In addition to statistical significance, the Project Leader reviewed data for clinical and financial significance.

### **3.8 Project Budget**

This improvement project requires minimal financial support (Appendix F). The progressive mobility protocol order did not previously exist in the Cerner electronic program. Thus, a staff member in the IT department worked approximately 8 hours to develop the progressive mobility protocol to be implemented into the SCCC and TSU order set. An hourly estimated cost of IT

personnel is \$30-\$36/hour, which suggests an accrued cost of \$240-\$288 for integrating the mobility protocol into the clinician order set. The project team leader, a CNS, designed the protocol and educational PowerPoint sessions. The time required to complete the protocol and educational sessions required approximately 40 hours of time at approximately \$42 per hour, equating to \$2,500 for the production of the project. Additional costs included the time of four RNIIIS who each spend 3.3 hours being educated on the protocol then educating staff. Key stakeholders involved in the project that spent extra time to assist with education were 4 RNIIIs. These nurses were educated for an extra 30 mins and spent an additional 3 hours educating staff. The estimated cost for these nurses was \$36.50. Clinicians within the TSU and SCCC were already discussing mobility as an expectation of physician rounds, so there are no associated time factors or costs related to discussing mobility. Additionally, it is a requirement of the nursing and PCT staff to mobilize patients, therefore no additional costs were associated with carrying out the progressive mobility protocol.

### **3.9 Dissemination Plan**

Following data analysis, the impact of implementing the nurse-driven progressive mobility protocol with post-operative surgical adult patients in a Surgical Critical Care Unit and a Transitional Surgical Care Unit to effect length of stay, mechanical ventilation duration, HAPUs, and VTEs were detailed in a project outcomes report developed by the DNP Project Student team leader. Dissemination plans include reporting findings at system wide nursing grand rounds and professional practice meetings. Additional dissemination plans include

submission of a journal article for professional publication in AACN's *Critical Care Nursing Journal* and an abstract submission to AACN for National Teaching Institute's Critical Care Conference's podium presentation. The necessity to share this practice change and assist other organizations in adopting the practice of progressive mobility is key to advancing nursing practice. The need for evidenced based practice changes at the bedside across all of critical care is essential to improve patient outcomes and promote practice changes (Melnyk & Fineout-Overholt, 2015).

## Chapter 4

### RESULTS

#### 4.1 Sample

The retrospective matched comparison sample who did not receive the Progressive Mobility Protocol included all 261 adult patients admitted to the SCCC (N=120) and TSU (N=141) between September 1, 2017 and November 1, 2017 (Table 1). The protocol group consisted of 243 adult patients admitted to the SCCC (N=111) and TSU (N=132) between September 1, 2018 and November 1, 2018 and who received the “Progressive Mobility Protocol” implementation. The two samples of both the SCCC and TSU retrospective matched comparison groups and protocol groups were roughly equivalent when comparing major demographic characteristics, including age and sex (Table 4.1). The mean age and gender of SCCC retrospective matched comparison group and the TSU retrospective matched comparison group were very similar. No acute adverse events nor increased complications associated with early mobility were reported.

Table 4.1 Patient Characteristics

Variable	SCCC*		TSU**	
	Retrospective	Protocol	Retrospective	Protocol
N	120	111	141	132
Age (SD)	64.7 (7.98)	66.4 (5.81)	64.4 (7.44)	62.6 (6.80)
Male, n (%)	74 (61.6)	71 (64)	88 (62.6)	80 (60.6)

Note. \* Surgical Critical Care Complex; \*\* Transitional Surgical Unit

## 4.2 Outcomes: ICU and Hospital Length of Stay

The main dependent variable was length of stay (LOS), which was calculated for both samples at two time points. The first time point was the intensive care unit (SCCC) LOS and the second was for the entire hospitalization, which included SCCC and TSU. The retrospective comparison group mean SCCC LOS was 5.75 days and the mean hospital LOS (SCCC & TSU combined) was 9.16 days. In contrast the protocol group mean SCCC LOS was 5.58 days and mean hospital LOS was 8.67 days, a mean loss of -.17 and -.49 days in the protocol group. As described in Section III, data did meet the assumptions of an independent t-test and Mann-Whitney U, a non-parametric testing, was used to analyze the data. There was no statistically significant decrease in LOS for the overall hospital ( $U = 6473$ ,  $p = .886$ ) or ICU ( $U = 6238$ ,  $p = 0.886$ ). However, these results are clinically and financially significant. The protocol group on average spent less days in the ICU (0.17) and had an overall decrease in hospital length of stay (0.49). See tables 4.2 and 4.3 for more details.

Table 4.2 ICU Length of Stay (LOS) Statistics

SCCC*	Mean	SD
Retrospective (N=120)	5.75	3.71
Protocol (N=111)	5.58	2.83

Note. \* Surgical Critical Care Complex

Table 4.3 Hospital Length of Stay (LOS) Statistics

SCCC* & TSU**	Mean	SD
Retrospective (N=261)	9.16	4.66
Protocol (N=243)	8.67	3.13

Note. \* Surgical Critical Care Complex; \*\* Transitional Surgical Unit

### 4.3 Nursing Sensitive Harm Events

The retrospective comparison group (N=37) required 7.16 days of mechanical ventilation; and the protocol group (N=34) required 7.03 days; the protocol group required 0.13 less days of mechanical ventilation (Table 4.4).

Using Mann-Whitney U analysis to compare the two groups on mean length of mechanical ventilation resulting in no statistically significant differences between the two groups (U=261; p=0.238). Similar to the LOS results, these results are clinically significant and have financial implications for the organization.

Table 4.4 Mechanical Ventilator Duration (Days)

<b>SCCC</b>	<b>Mean</b>	<b>SD</b>
Retrospective (N=37)	7.16	4.42
Protocol (N=34)	7.03	5.34

Note. \* Surgical Critical Care Complex

#### *DVT/Pressure Ulcers*

In the combined (SCCC/TSU) retrospective comparison group, there was one patient who developed a DVT and none in the protocol group. There were three patients with pressure ulcers in the retrospective comparison group and one patient in the protocol (Table 4.5). The number of events in total were too few for statistical analysis. Again, these results revealed clinical and financial significance for the organization.

Table 4.5 Hospital Acquired Pressure Ulcers (HAPU) and Venous Thromboembolisms VTEs & HAPU(s) Events

<b>SCCC* &amp; TSU**</b>	<b>HAPU</b>	<b>VTE</b>
Retrospective	3	1
Protocol	1	0

Note. \* Surgical Critical Care Complex; \*\* Transitional Surgical Unit

## **Chapter 5**

### **INTERPRETATION OF THE DATA**

#### **5.1 Discussion and Interpretation of Findings**

The purpose of this study was to evaluate the effectiveness of a progressive mobility protocol on patient outcomes related to immobility including length of stays in the intensive care unit (SCCC) and overall hospital stay; mechanical ventilation duration, and the incidence of pressure ulcers and DVT in a surgical critical care and transitional care unit. The retrospective group consisted of all patients admitted to SCCC and TSU one-year prior during the same time period as the protocol group (September 11, 2017-November 11, 2017 vs September 11, 2018-November 11, 2018). After the implementation of a progressive mobility protocol in the SCCC and TSU, the SCCC and overall hospital LOS decreased and the number of nursing sensitive immobility-related harm complications decreased from those seen one year earlier in a comparison group. The differences in sample sizes between the matched retrospective comparison and protocol groups depended on various factors. The data indicate that more patients were admitted to both units during the retrospective time period which could be a result of daily patient flow within the units and the organization. Additionally, patient populations change in regards to injuries, acuity, and discharge disposition.

First, length of stay in the ICU decreased by -0.17 and in the overall length of stay by -0.49. While these decreases were small and not statistically significant, they are clinically significant. Although this project did not specifically study cost savings, there were potential savings that was deduced from the outcomes provided from the project data. A reduction in ICU LOS and overall LOS as revealed in this project analysis, could equate to a potential significant hospital savings (Agency for Healthcare Research and Quality [AHRQ], 2019). According to the Healthcare Costs and Utilization Project (HCUP, 2016), one day in the ICU averages \$8,600. Using the rate base of \$8,600, a 0.17 reduction of a day in the ICU yields a cost savings of \$1,462 per day, per patient. When considering 111 patients who received the protocol, the cost savings realized by the protocol was \$162,282.

This project found a reduction in overall LOS. The average cost for length of stay in the hospital is \$10,400 per day (AHRQ, 2019). The data from the project revealed a reduction of 0.49 days for overall length of stay, which yields an average of \$5,096 cost savings per day, per patient. When considering the total of 243 patients (SCCC & TSU), the cost savings amount to \$1,238,328. Finally, the reduction of ventilation duration was observed in this study. Ventilator associated costs equate to an average of \$440 per day (AHRQ, 2019). With a reduction of 0.13 duration days, an average of \$57.20 cost savings per patient, per day is recognized. When considering the 34 protocol patients, costs associated with reduction in ventilator duration (0.13 days) could yield a cost savings of \$1,945. Overall, an average cost savings of \$1,402,555 is expected with reduced

ICU and overall length of stay, and reduced ventilator duration days (see Table 4.6).

Reduction of hospital acquired conditions are consistent areas of focus in health care institutions due to multiple negative outcomes, which include financial concerns related to potential increased length of stay, lack of reimbursement and associated fines. Likewise, reduction of nurse sensitive harm events also was evident in this study. Data revealed that the nursing sensitive harm events occurred only in SCCC and this could be possibly due to higher acuity levels of the patients. This project showed a reduction in HAPU and VTE incidence in SCCC. The average healthcare cost associated with a pressure ulcer has been estimated to be \$43,180 per patient (AHRQ, 2019). This project revealed two less pressure ulcer in the protocol group, which suggests a predicted cost savings of \$86,364. Healthcare costs associated with VTE diagnosis averages \$13,450 per patient and this project revealed a reduction of one VTEs. This equivalates to \$13,450 in costs savings. With fewer nurse sensitive harm events, patients are more likely to have shorter length of stays and less likely to be readmitted, which could result in an even in higher cost savings. Therefore, the annual cost savings potentially could be quite large. This project yielded an estimated total cost of 1.46 million.

Table 5.1 Estimated Financial Organizational Savings

	<b>Days or Event</b>	<b>National Average* per Day</b>	<b>Project Savings per day</b>	<b>Estimated Cost Savings</b>
Intensive Care Unit LOS **	-0.17 days	\$8600	\$1462/day	\$162,282
Hospital LOS	-0.49 days	\$10,400	\$5,096/day	\$1.2 million
Ventilator Duration Days	-0.13 days	\$440	\$57.2	\$1,945
HAPIs +	2 less	43,180	N/A	86,364
VTEs ++	1 less	13,450	N/A	13,450
<b>Estimated Savings during Project \$1.46 million</b>				

Note. \* National Average from Healthcare Costs and Utilization Project (2016) and Agency for Healthcare Research and Quality (2019); \*\* LOS = Length of Stay; + HAPIs = Hospital Acquired Pressure Ulcers; ++ VTEs = Venous Thromboembolisms

## 5.2 Project Limitations

Several limitations were identified during implementation of the progressive mobility protocol. The primary limitation was that project could not be implemented as a true, pre-post treatment design (Cook & Campbell, 1979). Instead a matched control group design was used comparing the performance of patients in two matched time periods, one receiving the protocol and compared to the patient group that did not. This time span could lead to some variation because of staff experience, staffing levels, and patients who are selected due to the changes in acuity levels and surgical procedures. A second design limitation was the low observation rate of nurse sensitive harm events during the two time periods. Both the SCCC and TSU had low number of nurse sensitive harm events (e.g. VTE, VAE, HAPUs), which made it difficult to analyze a comparison from the pre-and-post intervention groups.

The protocol fidelity was challenged at several times points that may have affected the observed outcomes. Inconsistent practice patterns from physicians may have affected the patients' ability to participate in mobility and subsequent ambulation trials. Some physicians were late to place the patient on the "progressive mobility protocol," but this was immediately rectified within 2 weeks after meeting with the Medical Director. Another limitation identified was the lack of ICU nurse support for this project. Often excuses, such as time constraints, lack of support from physical therapy, and patients' increased acuity were offered as feedback within the first two weeks. Re-education was provided by RNIII's and the project leader in regards to the safety of early mobility and coordination of resources. Additionally, the project leader performed chart reviews to ensure physical therapists were in fact assisting with those patients who had consults were completed on patients. Some of the changes in mobilization efforts may have been related to the implementation of the mobility protocol itself.

Finally, it is important to recognize that this particular health care setting, multiple practice improvement projects and research studies are simultaneously occurring at any given time. The short length of time, post implementation, for the evaluation was a limitation. This was a new program and there is a learning curve for staff to adjust to the program requirements. Maintaining momentum and compliance were difficult during the intervention period, particularly because of staffing changes. Consistent staffing may have led to better compliance, which may have led to a greater difference in quality outcome measures. Consequently,

an eight-week period to transform the culture of the unit and sustain the progressive mobility protocol change into practice is not sufficient. The more time for sustainability of this progressive mobility project would provide additional data to analyze for the possibility of more positive patient outcomes.

### **5.3 Implications for Advanced Practice**

There are numerous opportunities for advanced practice nurses to be leaders in healthcare by implementing change. As a CNS, it is necessary to address healthcare complications and advocate for change within practice areas to support and implement evidence-based projects to improve patient outcomes. Additionally, as an advanced practice nurse (APN), it is within the scope of practice to identify barriers associated with nursing care, review literature and provide evidence-based solutions to provide optimal care for patients (AACN, 2017). Current literature supports implementation of progressive mobility protocols to increase mobility of patients in ICUs (Hopkins et al., 2016; Jolley et al., 2016; Moyer et al., 2017). When ICU patients are not mobilized effectively, evident complications can occur. Studies of early mobilization of ICU patients have indicated the effects on duration of mechanical ventilation, hospital and ICU length of stay, duration of mechanical ventilation, mortality, functional status, prevalence of pressure ulcers and VTEs, as well as other adverse events (Campbell et al., 2015; Hopkins et al., 2016; Moyer et al., 2017).

As the population of the United States ages, the number of patients undergoing elective and emergency surgeries will increase. It is the responsibility of APNs to prevent and reduce hospital-acquired complications and nursing

sensitive indicators by ensuring patients maintain functional well-being and manage symptoms associated with an acute traumatic condition. (Barker et al., 2012; Parker, Sricharoenchai, & Needham, 2013; Wieske et al., 2015). An early mobilization protocol addresses barriers and promotes the reduction hospital acquired conditions and nursing-sensitive outcomes (Wieske et al., 2015). APNs play a key role in mobility protocol project implementation as they have educational knowledge and experience to coordinate with leadership and multidisciplinary teams to successfully carry out a progressive mobility protocol. Additionally, APNs who recognizes benefits of early range of motion and bedrest activity makes a difference in all the outcomes evaluated in this project. If these very complex patients are expected to progress, APNs must take the lead with promoting increased levels of activity in ICU patients, even while restricted to bed due to multisystem failure.

#### **5.4 Recommendations for Further Nursing Projects**

There is a need for a more robust project. This would be more beneficial if at a minimum one could implement a true intervention design with a control group (no protocol) and an intervention group that receives the protocol during the same time period with similar acuity levels and diagnoses. As the body of literature continues to grow in the surgery population, the evidence is revealing that increasing patient's mobility after hospital admission and/or quickly after a surgical procedure improves outcomes. For institutions that perform large volumes of surgical procedures annually, such as academic medical centers, improved mobility and its positive outcomes have multiple fiscal and quality

implications. Additionally, further projects should study nursing perceptions, such as perceived barriers and adherence to progressive mobility programs.

Actual, instead of proposed, cost savings should be studied as well. As the healthcare payer systems evolve, quality and financial measures, such as readmission and prevention of complications will assist with senior administrative leadership promotion of progressive mobility protocols for all patients. Although, no adverse events occurred as a result of mobility activities, another focus area could be on mortality data at intervals during implementation of the project. Additionally, any future data analysis should include patient acuity to provide more accurate assessment of the intervention and patient outcomes. Finally, mobility studies are needed for a longer implementation time for specific patient populations. The trauma population is particularly important and there is little evidence published about early mobility in this population and most mobility literature is specific to pulmonary, medical, and uncomplicated general surgery patients. Finally, supplemental projects on the effects of leadership and coaching would provide valuable information to better guide the implementation of mobility protocols in ICUs.

## **5.5 Sustainability of the Project**

Sustainability is the goal to any quality improvement project that is evidenced-based with positive outcomes (Chambers, 2015; Melnyk & Fineout-Overholt, 2015). When implementing evidence-based research through quality improvement projects, APNs and other healthcare professionals often face challenges. This is necessary to address challenges and utilize these challenges to

refine the implementation process and executing a project to ensure success and sustainability (Melnyk & Fineout-Overholt, 2015). The literature suggests that the key to sustainability in healthcare is identifying and including support from leadership (physician and nursing), nursing champions, and key stakeholders before initiation of the project. Additionally, it is necessary to involve these groups to identify barriers and support necessary modifications to the project (Chambers, 2015; Melnyk & Fineout-Overholt, 2015).

As with the implementation of any new protocol, there are challenges and hurdles to overcome. The most challenging hurdle to overcome was unit culture. Initially, mobility was not viewed as a priority and many of the patients were seen as too ill or had too many complicated lines and devices. Multidisciplinary commitment, daily protocol reinforcement, and active engagement of patients/families were the cornerstones to success and sustainability in the progressive mobility program. In critical care units, nurses have various levels of knowledge and motivation as well as many competing priorities, thus it is necessary for staff to understand the evidence around the initiative and participate in the development of the program to be successful.

Sustainability for this project continues to build as challenges to early mobility are overcome. Overall, staff support is increasing and ICU culture is changing, as patients are being safely mobilized and nurses are becoming more comfortable with the process. Continuous efforts from the project leader and all key stakeholders involved on this quality improvement project is required to provide sustainability in the future. Ongoing education about the importance of

early mobility, sharing positive and negative outcomes with staff and continued collaborative efforts from interdisciplinary teams within the ICU have also increased sustainability.

## **5.6 Significance of the Project**

Any program that potentially reduces patient complications, length of stay, costs, and improve functional recovery is worthy of consideration by nursing leadership. The progressive mobility protocol had minimal startup costs and required no additional staffing to implement. Currently, the most complicated patients (surgical, cardiac, renal, and multisystem organ failure) are mobilizing with various therapies, such as ventricular assistive devices, stable ventriculostomies, and mechanical ventilation without complications. The results of this project indicate that early mobilization leads to positive outcomes and reduce costs for patients with a variety of medical diagnoses and surgical conditions. This quality improvement initiative also demonstrated that early mobilization of patients admitted to the SCCC and TSU was safe and effective. Therefore, implementing mobility as a routine part of care in health care provides innumerable opportunities to improve the health and outcomes of similar patient populations admitted to the SCCC and TSU.

## **5.7 Conclusions**

Critically ill patients are subjected to long periods of immobility, which often results in prolonged ventilation time, and increased LOS and increased prevalence of nursing sensitive indicators (Azuh et al., 2016; Sigler et al., 2016). Additionally, bedrest may lead to complications such as pneumonia, delirium,

pulmonary embolism, muscle atrophy and joint contractures, which can lead to an increased LOS, morbidity, and overall costs (Campbell et al., 2015; Fraser et al., 2015; Sigler et al., 2016; Wieske et al., 2015). The benefits of bedrest or immobility are not supported in the literature, due to the negative effects of patient outcomes (Sigler et al., 2016). Unfortunately, despite research suggesting early mobility is best practice, there are numerous barriers to early mobilization for the critically ill patient population, including nursing and physician resistance, time constraints, and culture of each unit (Campbell et al., 2015; Sigler et al., 2016; Weiske et al., 2015).

The need for a standardized approach to mobilizing critically ill patients is essential to improve patient outcomes and the quality of care in intensive care units. Critically ill patients typically do not get out-of-bed until they have been extubated, resulting in longer LOSs and further complications (Azuh et al., 2016; Campbell et al., 2015; Hopkins et al., 2016; Jolley et al., 2016). A nurse-driven progressive mobility protocol allows for safe progression in patient mobility therefore decreasing complications and LOS. Research suggests that early mobility, in and out-of-bed, can both be safely performed (Jolley et al., 2016; Parry, 2016; Sigler et al., 2016; Weiske et al., 2015).

Although statistically significant differences were not found between the retrospective comparison and protocol groups in this progressive mobility scholarly project, there were clinically and financially significant outcomes. There were decreases in ICU LOS, hospital LOS, ventilator duration time, DVT, and pressure ulcer prevalence. This Doctorate of Nursing Practice project served as

the catalyst for changing the culture from one of bedrest and decreased mobility to a culture that supports and promotes recovery through mobility. Finally, this intervention demonstrated role progressive mobility protocols have in improving patient outcomes, promoting faster patient progression through the acute postoperative phase of care, and reducing healthcare costs.

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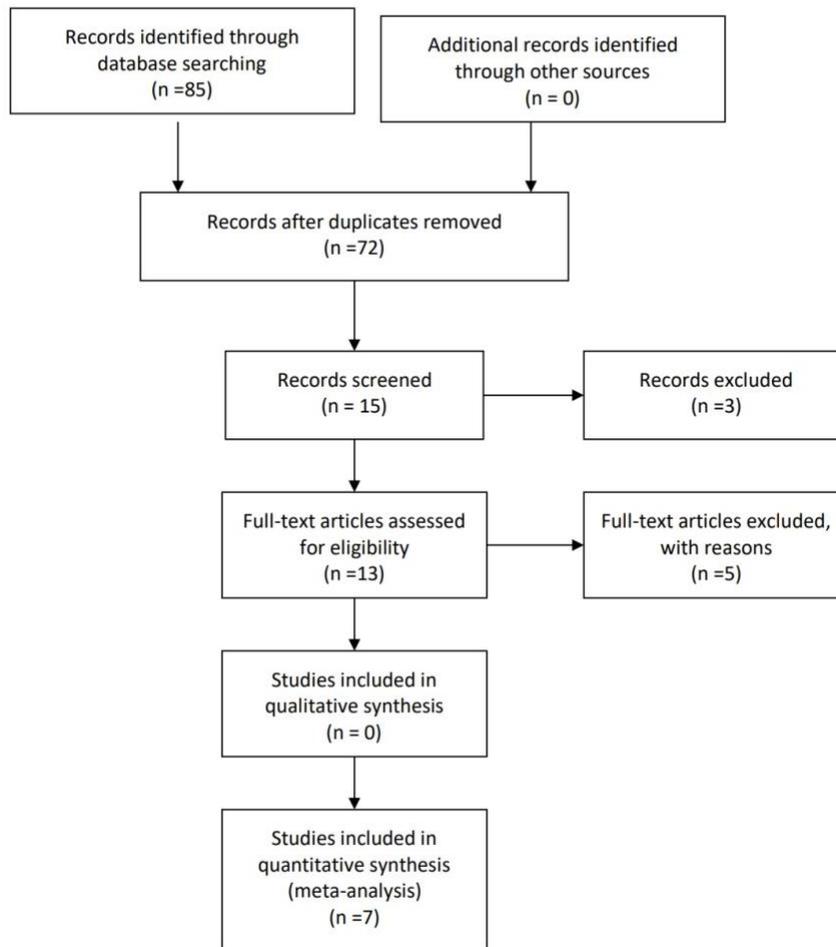
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## Appendix A

### PRISMA FLOW DIAGRAM

PRISMA 2009 FLOW Diagram (Moher, Liberati, Tetzlaff, & Altman, 2009)



## Appendix B

### SYNTHESIS OF LITERATURE

Citation of a Single Study, alpha order	Study Design/ Method  Level of Evidence	Sample: Setting, N, and mean age	Major Variables Studied & their definitions	Findings
Azuh, O., Gammon, H., Burmeister, C., Frega, D., Nerenz, D., DiGiovine, B., & Siddiqui, A. (2016). Benefits of early active mobility in the medical intensive care unit: A pilot study. <i>The American Journal of Medicine</i> , 129, 866-871.	Prospective Observational study  Hierarchy of evidence: Level 3	Medical ICU patients; Large Level 1 trauma center  N=3233 Mean age=61.5	Hospital acquired pressure ulcer (Stages 1-4, unstageable, and deep tissue injury)  Rate of ventilator associated pneumonia  -ICU length of stay  Hospital readmission	UAPU decreased to 6.1 (P=0.0405)  ICU length of stay decreased by 1 day (P<0.01)  Hospital readmission rate decreased 17.1% to 11.5% (P=.0010)  Rate of VAP= no change

Citation of a Single Study, alpha order	Study Design/ Method  Level of Evidence	Sample: Setting, N, and mean age	Major Variables Studied & their definitions	Findings
<p>Clark, D. E., Lowman, J. D., Griffin, R. L., Matthews, H. M., &amp; Reiff, D. A. (2013). Effectiveness of an Early Mobilization Protocol in a Trauma and Burns Intensive Care Unit: A Retrospective Cohort Study. <i>Physical Therapy</i>, 93(2), 186–196. <a href="http://doi.org/10.2522/ptj.20110417">http://doi.org/10.2522/ptj.20110417</a></p>	<p>Retrospective cohort study  Hierarchy of Evidence: level 3</p>	<p>28-bed Trauma/ Burn ICU 900-bed university hospital and a level 1 trauma center.  critically ill and have injuries resulting from trauma or burns  Pre-intervention: N=1044; mean age 44.1  Post-intervention: N=1132; mean age= 46.6  Total N=2176</p>	<p>VAP DVT LOS HAPU BSI Home disposition</p>	<p>LOS decreased by 2.4 days (P=0.02)  Decreased VAP (RR=0.79, 95% CI=0.66-0.93)  Decreased pulmonary complications (RR=0.84, 95% CI=0.74-0.95)  Decreased vascular complication (RR=0.58, 95% CI=0.45-0.75)  No statistical difference in HAPU  No statistical difference in BSI  No statistical difference in home disposition</p>

Citation of a Single Study, alpha order	Study Design/ Method  Level of Evidence	Sample: Setting, N, and mean age	Major Variables Studied & their definitions	Findings
<p>Klein, K. Mulkey, M., Bena, J.F., &amp; Albert, N.M. (2015). Clinical and psychological effects of early mobilization in patients treated in a neurologic ICU: A comparative study. <i>Neurologic Critical Care</i>, 43, 865-873</p>	<p>Prospective, two group, pre and post intervention Hierarchy of Evidence: Level 3</p>	<p>22 bed Normotensive care unit in a 1200 bed urban, quaternary-care, academic hospital; All patients admitted to the neuro ICU.  N=637 total patients; pre-intervention n = 260 and post-intervention n=377  mean age: 61.3</p>	<p>Maximum Mobility status Length of stay Mortality Disposition Home VAP BSI HAPU</p>	<p>Maximum mobility status (p&lt;0.001) Decreased LOS (P&lt;0.001) Mortality P=0.012 Disposition home (P&lt;0.033) VAP (P=0.11) BSI (P=0.015) HAPUs (P=0.026)</p>

Citation of a Single Study, alpha order	Study Design/ Method  Level of Evidence	Sample: Setting, N, and mean age	Major Variables Studied & their definitions	Findings
<p>Sigler, M., Nugent, K., Alalawi, R., Selvan, K., Tseng, J., Edriss, H., . . . Krause, D. (2016). Making of a successful early mobilization program for a medical intensive care unit. <i>Southern Medical Journal</i>, 109(6), 342-345. doi:10.14423/SMJ.0000000000000472.</p>	<p>Retrospective evaluation study  Hierarchy of Evidence: Level 3</p>	<p>Medical ICU at University Medical Center in Lubbock, Texas  All critically ill patients admitted to the ICU  N=76</p>	<p>VAP  LOS  HAPU</p>	<p>Decreased LOS (P&lt;0.001)  VAP (P&lt;0.05) HAPUs (P&lt;0.001)</p>
<p>Stolbrink, M., McGowan, L., Saman, H., Nguyen, T., Knightly, R., Sharpe, J., ... Turner, A. M. (2014). The Early Mobility Bundle: a simple enhancement of therapy which may reduce incidence of hospital-acquired pneumonia and length of hospital stay. <i>The Journal of Hospital Infection</i>, 88(1),</p>	<p>RCT (cluster) design)  Hierarchy of Evidence: Level 2</p>	<p>single hospital association in Birmingham, which has three hospital sites,  Intervention =333; mean age=75; control group=250; mean age 81</p>	<p>HAP LOS Activity level Falls HAPU</p>	<p>25 fewer HAP; P&lt;0.001) LOS lower (5.2 vs 8.5; (P&lt;0.001) Activity level increased (83 mins vs 40.5 mins; P&lt;0.001) No difference in falls (5 vs 6)  No difference in HAPU (2 vs 2)</p>

Citation of a Single Study, alpha order	Study Design/ Method  Level of Evidence	Sample: Setting, N, and mean age	Major Variables Studied & their definitions	Findings
34–39. <a href="http://doi.org/10.1016/j.jhin.2014.05.006">http://doi.org/10.1016/j.jhin.2014.05.006</a>				

*Note.* Modified from: Melnyk, B. M., & Fineout-Overholdt, E. (2015). *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed.). Wolters Kluwer: Philadelphia.

Key:

BSI- Blood stream infection

DVT- Deep vein thrombosis

HAP- Hospital acquired pneumonia

HAPU- Hospital acquired pressure ulcer

ICU- Intensive care unit

LOS- length of stay

MICU-Medical intensive care unit

N/A- Not applicable

RCT- Randomized control study

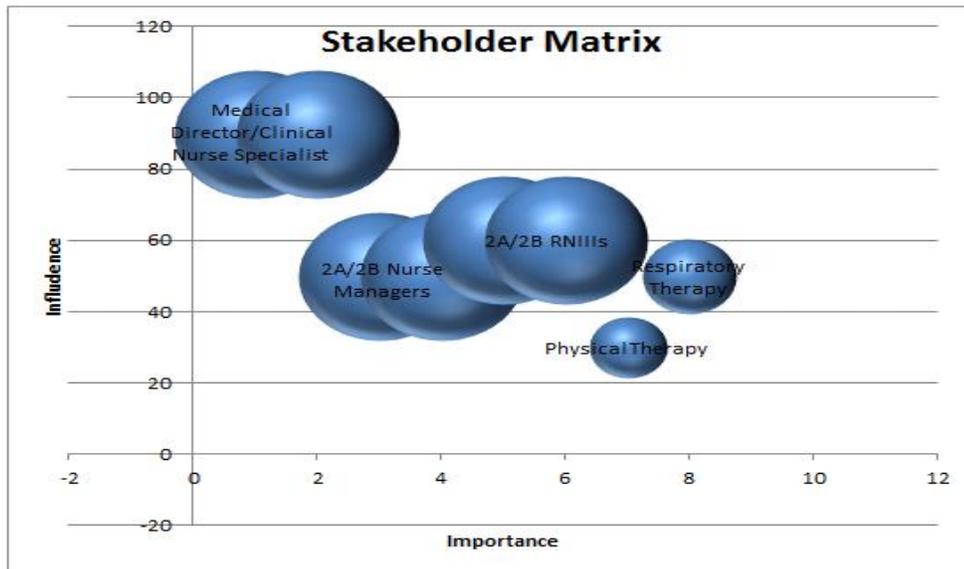
SICU- Surgical intensive care unit

VAP- Ventilator associated pneumonia

## Appendix C

### STAKEHOLDER MATRIX

Key Stakeholders	Importance	Influence	Magnitude
Medical Director	90	90	8100
Clinical Nurse Spec	90	90	8100
2A Nurse Manager	50	90	4500
2B Nurse Manager	50	90	4500
SCCC RNIIIs	60	90	5400
TSU RNIIIs	60	90	5400
Physical Therapy	30	30	600
Respiratory Therapy	50	30	1500



## Appendix D

### IRB APPROVAL



Helen F. Graham Cancer Center & Research Institute  
West Pavilion - Suite 2350  
4701 Ogletown Stanton Road  
Newark, DE 19713

302-623-4983 phone  
302-623-4989 phone  
302-623-6863 fax

#### MEMORANDUM

Steven Kusner, MD  
Chairman, IRB #1  
Gary Johnson, PhD  
Chairman, IRB #2  
Jerry Castellano, Pharm.D, CIP  
Corporate Director  
Janet Leary-Prowse, MSEd, CIP  
IRB Education Specialist  
Heidi Derr, B.A, CIP  
IRB Regulatory Affairs/Auditor  
Sonia Martinez-Colon  
Executive Assistant  
Wendy Bassett  
Administrative Assistant  
Lee McCormick  
Administrative Assistant

**DATE:** August 6, 2018

**TO:** Tiffany M Snow, MSN, APRN, ACNS-BC, CCRN  
Nursing Research  
Christiana Hospital

**FROM:** Sonia Martinez-Colon 

**RE:** **CCC# 38118 - The Use of a Progressive Mobility Protocol to Enhance Patient Outcomes.: (DDD# 604052)**

This is to officially inform you that your protocol was approved by Expedited Review per 45 CFR 46.110(f)(5)(7) with an Alteration of Consent 45 CFR 46.116(d) and Waiver of HIPAA Authorization 45 CFR 164.512(l)(i)(2)(ii), by Jerry Castellano, Pharm.D, CIP, Corporate Director of Christiana Care Health System Institutional Review Board (IRB00000479), on 08/01/2018. Approval was granted for a period of one year, from 08/01/2018 through 07/31/2019.

The above stated CCC# (Christiana Care Corporation number) has been assigned to your research. That number, along with the title of your study, must be used in all communication with the IRB Office.

Changes in this protocol after the initial approval may not be initiated without Institutional Review Board review and approval, except where necessary to eliminate apparent immediate hazards to the human subject. Also, if you encounter any adverse effects or deaths that must be reported to the company and the FDA, the committee must be so informed immediately by phone.

In addition, a periodic review of this protocol will be conducted in six months to a year from the above approval date. At that time, you will be required to complete a review form with all available information collected to date on your protocol.

A final requirement is that you notify the Institutional Review Board when this protocol is completed, and all results are to be summarized for the committee's review.

If you have any questions, please contact the IRB Office.

*This approval verifies that the IRB operates in Accordance with applicable ICH, federal, local and institutional regulations, and with all GCP Guidelines that govern institutional IRB operation.*

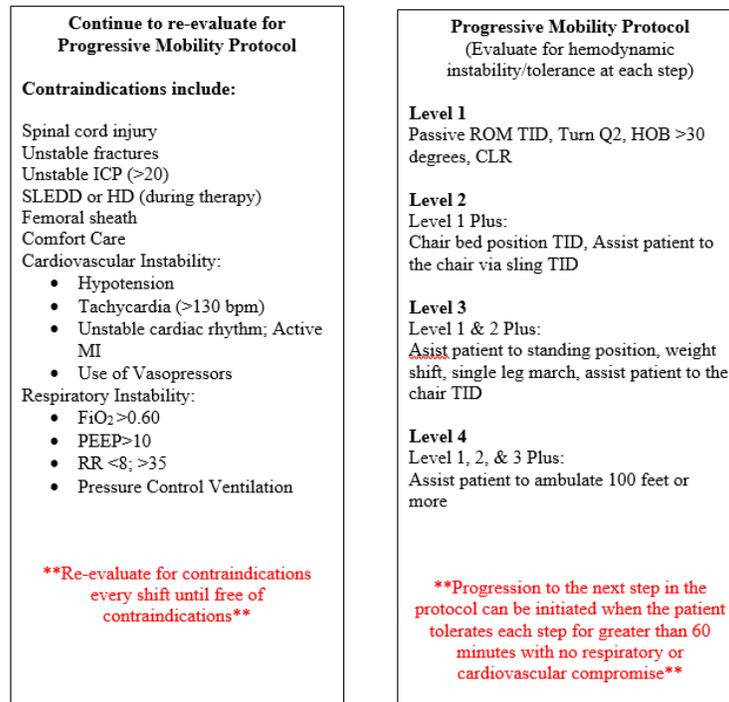
## Appendix E

### PROGRESSIVE MOBILITY PROTOCOL\*

(Respiratory therapy is required to be present at all times when mobilizing intubated patients)  
Are there any contraindications for progressive mobilization?

Yes

No



**Note.** Revised from American Association of Critical Care Nurses Progressive Mobility Protocol.

## **Appendix F**

### **THE EGRESS TEST<sup>®</sup>**

1. Three reps of sit to stand (first rep patient just clears the surface to see if their legs can support them)
2. Three steps of marching in place (utilize any baseline assistive devices)
3. Advance step and return each foot

## Appendix G

### BUDGET ANALYSIS

<b>Role</b>	<b>Estimated Hourly Wage*</b>	<b>Time (hours)</b>	<b>Total Amount (dollars)</b>
IT	\$34-\$36	8	\$240-\$288
CNS	\$44	40	\$2,500
RNIII (n = 4)	\$35-\$38	3	\$490-\$532
			<b>Project Total: \$3,230-3,320</b>

Note. Estimated hourly wage is for Delaware.