

REFINING, IMPLEMENTING AND EVALUATING A NEURO EARLY MOBILIZATION  
PROTOCOL IN THE NEUROSCIENCE INTENSIVE CARE UNIT

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## ABSTRACT

Megan A. Brissie: Refining, Implementing and Evaluating a Neuro Early Mobilization Protocol in the Neuroscience Intensive Care Unit  
(Under the direction of Meg Zomorodi)

Patients admitted to the Neuroscience Intensive Care Unit (NSICU) often suffer from neurological injuries, which can affect their long-term functional outcome. These patients are often admitted to the NSICU for prolonged periods of time, frequently requiring ventilator assistance, as a result of their neurological illness. If these patients are not mobilized, they are at greater risk of increased morbidity, mortality, infection, hospital costs, and prolonged hospital stays as a result of immobilization. In addition, patients in the NSICU often require special considerations and monitoring when implementing early mobilization efforts. Few studies have evaluated the safety and feasibility of using an early mobilization protocol designed for the NSICU. The goal of this project was to design, implement, and evaluate a Neuro Early Mobilization Protocol to be used by the staff of the NSICU.

To my friends and family who have supported me, encouraged me, and cheered me on along the way, I thank you. I could not have made it through without making many of the sacrifices that you so gracefully understood in order for me to achieve this accomplishment. To my parents, and especially my mom, thank you for all the meals you prepared, times you went shopping, and for keeping the house together. I love you both.

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## LIST OF ABBREVIATIONS

A	Agree
aSAH	Aneurysmal Subarachnoid Hemorrhage
bmp	Beats Per Minute
CNIV	Clinical Nurse Four
CST	Clinical Support Technicians
CV	Cardiovascular
D	Disagree
DNP	Doctor of Nursing Practice
DVT	Deep Vein Thrombosis
EMR	Electronic Medical Record
EVD	External Ventricular Drain
FiO <sub>2</sub>	Fraction of inspired Oxygen
GCS	Glasgow Coma Score
HCP	Health Care Professionals
HUC	Health Unit Coordinators
ICH	Intracranial Hemorrhage
ICP	Intracranial Pressure
ICU	Intensive Care Unit
IRB	Institutional Review Board
ISCU	Intermediate Specialty Care Unit
LOS	Length of Stay
MAP	Mean Arterial Pressure

MICU	Medical Intensive Care Unit
mmHg	Millimeter of Mercury
NA	Not Applicable
NG	Nasal Gastric
NP	Nurse Practitioner
NRC	Nursing Research Council
NSICU	Neuroscience Intensive Care Unit
OT	Occupational Therapy
PDSA	Plan-Do-Study-Act
PEEP	Positive End Expiratory Pressure
PI	Primary Investigator
PiCCO	Pulse index Continuous Cardiac Output
PORS	Patient Occurrence Reporting System
PROM	Passive Range of Motion
PT	Physical Therapy
PUMP	Progressive Upright Mobility Protocol
RN	Registered Nurse
RT	Respiratory Therapy
SA	Strongly Agree
SD	Strongly Disagree
S.D.	Standard Deviation
TBI	Traumatic Brain Injury
VAP	Ventilator Associated Pneumonia

## CHAPTER 1: INTRODUCTION

### **Background and Significance**

Each year, more than 5 million Americans are admitted to the intensive care unit (ICU) (Society of Critical Care Medicine, 2015). The population of the United States continues to age as a result of the baby boomer generation, and patients in the ICU are more critically ill than they were twenty years ago (Society of Critical Care Medicine, 2015). These patients typically require the assistance of a ventilator, cardiovascular support, and invasive monitoring during their ICU stay (Society of Critical Care Medicine, 2015). However, patients who once would have died in the ICU are now surviving their ICU stay due to advances in medical treatment, technology, and care (Schweickert & Kress, 2011; Vincent & Singer, 2010). While in the ICU, many patients are kept immobile as their medical condition and associated treatments are viewed as non-conducive to early mobilization (Engel, Tatebe, Alonzo, Mustille, & Rivera, 2013; Schweickert & Kress, 2011). However, immobilization can lead to complications such as infection, long-term weakness, disability, as well as lengthened hospital stays (Bassett, Vollman, Brandwene, & Murray, 2012; Engel, Tatebe, et al., 2013; Morris et al., 2008; Schweickert & Kress, 2011; Titsworth et al., 2012). Several studies have determined that early mobilization protocols can be used safely to reduce ICU patients' risk of infection, long term weakness, and hospital length of stay (LOS) in a cost effective manner (Bassett et al., 2012; Clark, Lowman, Griffin, Matthews, & Reiff, 2013; Engel, Tatebe, et al., 2013; Morris et al., 2008; Needham et al., 2010; Schweickert et al., 2009). Yet, early mobilization has been historically slow to

implement in many ICUs, especially the Neuroscience Intensive Care Unit (NSICU), due to the complexity of the patient's conditions and concern for patient's safety during mobilization (Engel, Needham, Morris, & Gropper, 2013).

Patients admitted to the NSICU often suffer from neurological injuries, which can affect their long-term functional outcome. NSICU patients at risk for immobility frequently require complex medical treatments, including ventilator assistance, as a result of neurological illness and/or damage, and typically remain in the NSICU for two weeks or longer (Diringer et al., 2011; Hemphill et al., 2015; Jauch et al., 2013; Swadron, LeRoux, Smith, & Weingart, 2012). If these patients are not mobilized, they are at greater risk of increased morbidity, mortality, infection, hospital costs, as well as prolonged hospital stays (Perme & Chandrashekar, 2009).

There are several reasons why patients may not be mobilized early in the NSICU, including patient sedation; lack of teamwork, safety concerns, resources, or time; a lack of understanding regarding the importance of early mobilization, and a need for change in the culture of the ICU (Engel, Needham, et al., 2013; Fan, 2010; Hopkins, Spuhler, & Thomsen, 2007; Schweickert et al., 2009). In addition, patients in the NSICU often require additional considerations and monitoring when implementing early mobilization efforts (Kocan & Lietz, 2013). Only a few studies have evaluated the safety, feasibility and benefits of using an early mobilization protocol in the NSICU (Klein, Mulkey, Bena, & Albert, 2014; Mulkey, Bena, & Albert, 2014; Titsworth et al., 2012).

## **Project Purpose**

Mobilization in the ICU is defined as a progressive continuum in which critically ill patients are assessed for readiness to tolerate activity and/or movement, based on the patient's specific diagnosis and care needs, and are safely mobilized in order to reduce complications from inactivity to improve patient outcomes (Vollman, 2013). Despite research findings supporting the utilization of early mobilization to improve patient outcomes and reduce hospital LOS, early mobilization efforts have not consistently and effectively occurred (Clark et al., 2013; Drolet et al., 2013; Engel, Tatebe, et al., 2013; Klein et al., 2014; Morris et al., 2008; Needham & Korupolu, 2010; Perme & Chandrashekar, 2009; Schweickert et al., 2009; Titsworth et al., 2012). Immobility can negatively impact patients in the NSICU because it is believed that immobilization of ICU patients leads to poor outcomes, including increased infections, muscle wasting, prolonged ventilator use and lengthy hospital stays (Kayambu, Boots, & Paratz, 2013). Early mobilization of patients, especially patients in the medical intensive care unit (MICU), has been proven to be beneficial and improve patient outcomes (Morris et al., 2008; Needham et al., 2010; Schweickert et al., 2009). While there have been several protocols developed and implemented in various ICU settings, including the NSICU, there currently is not a single tested and validated early mobilization protocol designed for use in the NSICU (Bassett et al., 2012; Clark et al., 2013; Drolet et al., 2013; Engel, Needham, et al., 2013; Engel, Tatebe, et al., 2013; Klein et al., 2014; Kocan & Lietz, 2013; Morris et al., 2008; Titsworth et al., 2012; Zomorodi, Topley, & McAnaw, 2012). Therefore, the purpose of this project is to refine, implement and evaluate a Neuro Early Mobilization Protocol with a multidisciplinary team of clinical support technicians (CST), nurses, nurse practitioners (NP), physicians,



physical therapists (PT), occupational therapists (OT) and respiratory therapists (RT) working together to increase mobilization efforts in the NSICU at UNC Health Care.

Specifically the following clinical questions will be addressed:

1. What are the benefits identified by health care professionals (HCP) when implementing an early mobility protocol?
2. What are the challenges identified by HCP when implementing an early mobility protocol?
3. What tools do HCP indicate are needed in order to implement an early mobility protocol in the NSICU?
4. Did any adverse events occur during mobilization while implementing the revised early mobilization protocol?

Using a post-implementation survey, what feedback do HCP offer following use of the early mobilization protocol? Specifically the following questions will be addressed:

1. Was the protocol usable?
2. Following implementation of an early mobility protocol, was there a change in HCP beliefs regarding mobilization safety and the need for mobilization in the NSICU?
3. What did the HCP like about the Neuro Early Mobilization protocol?
4. What recommendations were offered by HCP for ways to improve the protocol for future use?

## CHAPTER 2: REVIEW OF LITERATURE

### **Benefits to Early Mobilization in Medical Intensive Care Units**

It is widely supported that early mobilization, when initiated in the MICU, is feasible and safe (Engel, Tatebe, et al., 2013; Morris et al., 2008; Schweickert et al., 2009). Further, early mobilization improves patients' physical function and is a cost effective means of improving patient outcomes and reducing overall hospital LOS (Engel, Tatebe, et al., 2013; Morris et al., 2008; Needham & Korupolu, 2010; Schweickert et al., 2009). In a ground breaking study by Morris et al. (2008), the use of a mobility protocol initiated by a MICU's Mobility Team found that early mobilization was "feasible, safe, did not increase costs, and was associated with decreased intensive care unit and hospital length of stay" (p. 2238) in comparison to those patients who received standard care.

In a randomized controlled trial by Schweickert and colleagues (2009) exploring the use of early physical and occupational therapy for mechanically ventilated patients in the MICU, early mobility was found to be safe, well tolerated, leading to better functional outcomes, less delirium, and more ventilator free days when initiated within forty-eight hours after ICU admission. Patients who received mobilization efforts earlier during their ICU admission experienced an overall greater independent functional status at discharge than patients in the control group who received standard care (29 [59%] of patients in the study group vs. 19 [35%] of patient in the control group;  $p = 0.02$ ) (Schweickert et al., 2009). Interestingly, Schweickert et al (2009) reported that the overall improved functional status was not seen until approximately two weeks after the intervention had been initiated. This

finding suggests that the true benefit of early mobilization may not occur while the patient is in the ICU, but rather prior to patient discharge or during rehabilitation. In this study, functional status was measured at hospital discharge using the Barthel Index Scores (intervention group 75 (7.5-95), control group 55 (0-85);  $p = 0.05$ ), the number of independent activities of daily living achieved prior to discharge (intervention group 6 (0-6), control group 4 (0-6);  $p = 0.06$ ) and unassisted walking distance achieved prior to hospital discharge (intervention group 33.4 (0-91.4), control group 0 (0-30.4);  $p = 0.004$ ) (Schweickert et al., 2009). This finding is important to note for the NSICU population, as functional status is a key factor in morbidity and mortality of neurologically injured individuals (Go et al., 2013; Klein et al., 2014). Ultimately, although there was no change in patient ICU or hospital LOS, patient functional outcomes were improved (Schweickert et al., 2009).

In a prospective quality improvement study, ICU delirium and functional mobility were improved and LOS reduced, following implementation of a protocol to reduce sedation and increase rehabilitation consults (Needham et al., 2010). After the intervention was implemented, by having a multidisciplinary team focused on increasing mobilization efforts and increasing PT and OT presence in the MICU, more patients received rehabilitation treatments per patient (1 vs 7,  $p < 0.001$ ), patients achieved a higher level of functional mobility while in the ICU (sitting or greater, 56% vs 78%,  $p = 0.03$ ), and there was a decrease in ICU and hospital LOS by 2.1 and 3.1 days, respectively (Needham et al., 2010). As a result of improved patient throughput, the MICU saw a 20% increase in ICU admissions in comparison to the same time period the year before (Needham et al., 2010). Ultimately, by implementing a quality improvement process to reduce sedation, increase PT and OT

presence in the ICU, and increase patient mobility, patient's functional status improved and ICU LOS decreased (Needham et al., 2010). The result of this study indicates there is great benefit to a multidisciplinary early mobilization protocol in the ICU to assist with transitioning patients through the ICU and healthcare system.

### **Early Mobilization Outside the Medical Intensive Care Unit**

**Safety and Efficacy.** Patients with neurological injuries have not typically participated in many early mobilization studies since the majority of studies involving early mobilization have been done in MICUs. However, a few published reports on mobility outside of the MICU have been reported. In a retrospective quality improvement project by Engel et al. (2013) completed in a mixed medical-surgical ICU using a physical therapist, early mobility was found to be safe and feasible while reducing overall LOS. Yet, patients with neurological complications such as stroke, subarachnoid hemorrhage, and intracranial hemorrhage (ICH) were excluded from participating in the early mobilization program (Engel, Tatebe, et al., 2013). It is not clarified in the study why an acute neurological event was cause for these patients to be excluded from the early mobilization protocol.

Clark and colleagues (2013) established efficacy of a mobility protocol in the trauma and burn ICU through a retrospective cohort study. Although there was not a significant reduction in ventilator free days or LOS, there was a reduction in pneumonia and deep vein thrombosis (DVT) rates. It is also important to note that no adverse events occurred during early mobilization for this patient population (Clark et al., 2013).

Findings from these studies are promising and suggest that similar efforts to increase early mobilization in the NSICU can lead to similar results and improve patient outcomes. However, adverse events are a primary concern when mobilizing neurological patients.

Therefore, this project evaluated the number and type of reports filed through the Patient Occurrence Reporting System (PORS) as a result of implementing the revised Neuro Early Mobilization Protocol in the NSICU.

**Patient Outcomes.** Early mobilization efforts outside of the MICU have had varied results in patient outcomes (Bassett et al., 2012; Clark et al., 2013). In a multicenter trial examining trauma, medical, surgical, and cardiac ICUs, implementation of a multidisciplinary mobility program did not prove beneficial in reducing ventilator free days, mortality, or LOS (Bassett et al., 2012). Outcomes were poorly documented, as inaccurate and inconsistent data was collected from the various sites during the trial, to suggest adequate benefit to implementing early mobilization efforts (Bassett et al., 2012). Clear protocol documentation guidelines, especially for multicenter efforts, are needed in order to effectively explore if early mobility can impact patient outcomes outside of the MICU.

### **Benefits for Neuroscience Intensive Care Unit Patients**

Until recently, there was little evidence to support the use of early mobilization in the NSICU. In a prospective trial of an early mobility program in a 22 bed NSICU located in an academic urban hospital, patients in the post-intervention group (n = 377) achieved higher mobility levels, decreased hospital LOS (15.16 vs 10.21), decreased ICU LOS (7.37 vs. 4.75), and were more likely to be discharged to home compared to the pre-intervention group (n = 266) (Klein et al., 2014). Despite improvements in the reduction of LOS, there was no reduction in mortality, ventilator associated pneumonia, DVT, depression or hostility in this patient population (Klein et al., 2014). This brings into question how the underlying disease process of neurological injuries affects patient's outcomes despite early mobilization efforts. Additionally, there were no adverse events that occurred related to cerebral monitoring

dislodgement, oxygen compromise, hemodynamic instability, or slower recovery that occurred during early mobilization of this patient population (Klein et al., 2014). In spite of the lack of improvement in mortality, this study suggests that early mobility in the NSICU can be safely implemented and may lead to improved outcomes such as reduced LOS and a reduction in common complications from immobility such as blood stream infections and pressure ulcers (Klein et al., 2014).

The early progressive mobility protocol that was developed by Klein and colleagues (2014) was designed by nurse clinician leaders and was based on protocols available in the literature and was designed specifically for the NSICU. The protocol was designed to guide mobilization and included the following 1) exclusion criteria, 2) evaluation of patient tolerance, 3) steps for advancing patient mobilization, 4) documentation of mobilization, and 5) physical therapy consultation (Klein et al., 2014). For their mobilization initiative, mobilization was initiated at admission if the patient would tolerate mobilization and the staff were encouraged to use the bed features and lifts to assist with mobilization (Klein et al., 2014). A lift team was available to assist the nursing staff with mobility, while PT and OT performed usual care (Klein et al., 2014). The protocol itself had four progressive mobility milestones from lying, sitting, standing, to ultimately ambulating, with 16 mobility levels (Klein et al., 2014). The design of Klein's protocol influenced the steps in the design of this project's Neuro Early Mobilization Protocol.

In another prospective trial exploring the implementation of an early mobilization protocol in a tertiary care center's NSICU, findings revealed that early mobilization could be achieved safely while reducing hospital acquired infections and LOS (Titsworth et al., 2012). This study evaluated patient outcomes during a ten month pre-intervention group (n = 77)

and six month post-intervention group ( $n = 93$ ) following the implementation of a Progressive Upright Mobility Protocol (PUMP) Plus program (Titsworth et al., 2012). Implementation of the PUMP Plus program increased mobility of the patients in the NSICU by 300% ( $p < 0.0001$ ) (Titsworth et al., 2012). The average NSICU LOS decreased by 13% from 4.0 days pre-intervention to 3.46 days post-intervention ( $p < 0.004$ ) (Titsworth et al., 2012). In addition, the average number of hospital-acquired infections (ventilator associated pneumonia (VAP), central line infections, and catheter-associated urinary tract infections) decreased by 60% during the post-intervention period (average reduction from 5.5 to 2.2;  $p < 0.05$ ) with the greatest reduction occurring in the number of cases of VAP (2.14 to 0 per 1000 days;  $p < 0.001$ ) (Titsworth et al., 2012). Despite the increase in mobilization of the NSICU patients, there was not a significant increase in the total number of falls or critical line pulls defined as self-extubations, pulled arterial lines, or inadvertent external ventricular drain (EVD) removals (Titsworth et al., 2012). These findings indicate that the PUMP Plus program, an early mobilization protocol with eleven steps of mobilization, was safe for use with NSICU patients (Titsworth et al., 2012).

In a bidirectional case-control study of 30 patients admitted to a Neuro/Trauma ICU with a Glasgow Coma Score (GCS) of less than or equal to 12, patients who were involved in the structured mobility program with PT had favorable functional outcomes (Gillick, Marshall, Rheault, & Stoecker, 2011). In addition, those patients who received the structured mobility program had shorter ICU LOS than those who did not, (21.9 days vs. 16.4 days;  $p = 0.445$ ), although the difference was not significant (Gillick et al., 2011). While this study had a small sample size, findings reveal that even those patients with a poor GCS score at

presentation benefit from early mobilization and experience shorter ICU LOS (Gillick et al., 2011).

### **Special Considerations When Mobilizing NSICU Patients**

There are special considerations for neurological patients that must be addressed in the NSICU population. Patients in the NSICU typically suffer from neurological injuries resulting in hemodynamic instability, alterations in cerebral autoregulation, elevations in intracranial pressure (ICP) as well as neurological deficits that impair physical function, such as hemiparesis and aphasia (Kocan & Lietz, 2013). Therefore, specialized care and awareness need to occur when mobilizing these patients (Kocan & Lietz, 2013). Furthermore, patients in the NSICU often require additional cerebral monitoring including: EVDs, ICP monitors, and continuous electroencephalography while in the ICU (Kocan & Lietz, 2013). Great concern is often raised when attempting to mobilize patients with cerebral monitors and the effects that mobilization may have on cerebral autoregulation, ICP, and the patient's safety when attempting to mobilize patients with such monitors (Kocan & Lietz, 2013). These concerns are important to address when developing early mobilization protocols for NSICU patients.

**External Ventricular Drains.** In an observational study of 84 patients with EVDs, evaluating a total of 298 treatment sessions using passive range of motion (PROM), ICP actually decreased following PROM exercise (Roth et al., 2013). In addition, there was no significant difference between mean cerebral perfusion pressure or mean arterial pressure (MAP) following PROM (Roth et al., 2013). Finally, no adverse effects were reported following the initiation of PROM exercises on patients with EVDs (Roth et al., 2013). While further study is needed to evaluate whether or not there are differences that occur for various



diagnosis such as aneurysmal subarachnoid hemorrhage (aSAH), traumatic brain injury (TBI), or ICH, early treatment with PROM was found to be feasible and safe in patients whose ICP was less than 20 mmHg (Roth et al., 2013).

**Comatose Patients.** Comatose patients and patients who are unable to actively participate in mobilization activities may still benefit from early mobilization (Kocan & Lietz, 2013). Cardiovascular deconditioning is a result of long-term bed rest (Wieser et al., 2014). By elevating the patient's head of bed as well as placing the patient's bed in the chair position, orthostatic tolerance and alveolar ventilation can improve (Powers, Wiggs, Sollanek, & Smuder, 2013; Wieser et al., 2014). Finding ways to improve hemodynamic stability as well as pulmonary function for comatose patients in the NSICU has the potential to improve long term outcomes and reduce ventilator days.

**Aneurysmal Subarachnoid Hemorrhage.** Patients who experience aSAH also require special treatment regimens during their NSICU admission (Diringer et al., 2011). This includes placement of EVDs, intubation, Foley catheters, Pulse index Continuous Cardiac Output (PiCCO) monitoring, high volume fluid requirements, as well as the use of vasopressors to prevent the effects of delayed cerebral ischemia that cause secondary strokes (Diringer et al., 2011; Olkowski et al., 2013). However, despite the need for additional treatment modalities and the high risk for complications, including cerebral vasospasm, a retrospective study found that early mobilization was safe and feasible in this patient population (Olkowski et al., 2013). Of the 25 aSAH patients studied, on average early mobilization occurred on day 3.2 of hospitalization and each patient received 11.4 therapy sessions (Olkowski et al., 2013). Adverse events were documented 5.9% of the time and were documented as a MAP <70 mmHg (3.1%) or >120 mmHg (2.4%) and heart rate >130

bmp (0.3%) primarily occurring (5.0% of the time) in those patients with poor grade aSAH (Hunt Hess scale > III) (Olkowski et al., 2013). This finding indicates that patients with poor grade aSAH may suffer from greater neurological impairment and physiologic instability; which unfortunately are already anticipated complications as a result of high grade aSAH (Diringer et al., 2011; Olkowski et al., 2013).

In conclusion, nurses and other HCP need to be attentive to these special considerations when mobilizing patients in the NSICU, but this should not prohibit these patients from participating in early mobilization as there is strong evidence supporting improved long term outcomes and benefits from early mobilization.

### **Mobility Progression**

When mobilizing patients in the NSICU, there needs to be an awareness that these patients may not progress as rapidly through the stages of mobilization during their NSICU stay due to their diagnosis, presenting symptoms, and/or neurological deficits (Mulkey et al., 2014). In a study evaluating mobility progression of 228 patients in an NSICU, nearly 40% of these patients never progressed beyond bed movement and only 10% of these patients walked during their NSICU admission (Mulkey et al., 2014). Findings from this study also revealed that those patients who did not progress as rapidly through the stages of mobility while in the NSICU experienced poorer clinical outcomes (Mulkey et al., 2014). Yet, these patients may have experienced poor clinical outcomes despite receiving aggressive mobilization efforts, due to their neurological injuries and/or disease processes (Mulkey et al., 2014).

The findings from the reviewed literature suggest that the benefits to early mobilization far outweigh the risks. Although some patients in the NSICU may not progress

as rapidly through the steps of mobilization, staff should not be deterred from implementing the Neuro Early Mobilization Protocol because the potential for improved clinical and long term physical outcome has been shown to increase the earlier mobilization is initiated (Schweickert et al., 2009).

Patients in the NSICU with acute neurological injuries and physical deficits require special considerations when implementing early mobilization; yet, there exists a high potential for benefit from the use of an early mobilization protocol. Although several protocols have been developed, there is not a validated early mobilization protocol designed for safe, effective mobilization of patients in the NSICU (Bassett et al., 2012; Clark et al., 2013; Drolet et al., 2013; Engel, Needham, et al., 2013; Engel, Tatebe, et al., 2013; Klein et al., 2014; Kocan & Lietz, 2013; Morris et al., 2008; Titsworth et al., 2012; Zomorodi et al., 2012). A multidisciplinary approach is needed to refine the current protocol used in the NSICU at UNC Health Care in order to mobilize all patients cared for in the NSICU.

## **Conclusion**

Early mobilization, although not a common practice in the ICU, has been proven safe and feasible; and has led to improved patient outcomes and reduced hospital LOS. The ultimate goal of implementing the Neuro Early Mobilization Protocol in the NSICU is so that all patients can potentially receive mobilization efforts earlier and more often during their NSICU admission. Research needs to focus on how to effectively implement an evidence-based Neuro Early Mobilization Protocol into practice in order to safely increase patient mobilization in the NSICU. Therefore, the purpose of this study is to refine, implement and evaluate the usability of a Neuro Early Mobilization Protocol with a multidisciplinary team of CST, nurses, NP, physicians, PT/OT and RT working together to increase patient mobilization efforts in the NSICU at UNC Health Care.

### CHAPTER 3: CONCEPTUAL FRAMEWORK

The use of a systematic quality improvement process can be beneficial to assure project success to facilitate the translation of research into clinical practice (Ohtake, Strasser, & Needham, 2013). Much of the research on early mobilization in the ICU has used quality improvement methodologies to bring about process change (Drolet et al., 2013; Engel, Tatebe, et al., 2013; Needham & Korupolu, 2010; Needham et al., 2010; Ohtake et al., 2013). W. Edwards Deming first pioneered the quality improvement movement with the development of the Plan-Do-Study-Act (PDSA) Cycle that was heavily influenced by Walter A. Shewhart (Best & Neuhauser, 2006; Butts & Rich, 2011). The PDSA Cycle uses a systematic series of steps to gain knowledge for continued process improvement (The W. Edwards Deming Institute, 2014).

The Institute for Healthcare Improvement uses the Model for Improvement that was developed by the Associates in Process Improvement, which includes the PDSA Cycle, as a tool to accelerate improvement processes and test change (Associates in Process Improvement, 2014; Institute for Healthcare Improvement, 2014). This model has two parts, the first part consists of three fundamental questions: (1) What are we trying to accomplish? (2) How will we know that a change is an improvement? and (3) What changes can we make that will result in improvement? (Associates in Process Improvement, 2014). The second part of the PDSA Cycle is a never ending cycle that can be used to create and test the change and determine if the implemented change has led to an improvement (Associates in Process Improvement, 2014). By *planning* (identifying a need for change), *doing* (implementing a

change), *studying* (measuring and analyzing the process change and outcomes) and finally *acting* (if the desired results are not obtained), implemented changes can be constantly evaluated for success (Best & Neuhauser, 2006).

Drolet and colleagues (2013) used the PDSA model when planning and implementing a nurse driven “Move to Improve” project in an ICU and intermediate care setting. As evidenced by their study results, using a detailed PDSA Cycle to implement and evaluate the findings following protocol implementation, the number of ICU patients ambulating within 72 hours of hospital admission increased from 15.5% (54 of 349 patients) to 71.8% (257 of 358 patients) (Drolet et al., 2013). Engle and colleagues (2013) also provided a detailed step-by-step outline, using a PDSA Cycle, for implementing an early mobilization protocol in the ICU, based on three other quality improvement projects implemented at three different institutions (Burtin et al., 2009; Morris et al., 2008; Schweickert et al., 2009).

Not all changes lead to an improvement, but all improvement requires change (Institute for Healthcare Improvement, 2014). Implementing an early mobilization protocol into clinical practice will require a practice change in order to improve the mobility efforts of patients in the NSICU. Change is a complex process that takes time, effective communication, teamwork and constant evaluation to ensure project success. The Model for Improvement along with the PDSA Cycle will be an invaluable tool to guide the refinement, implementation and evaluation of the Neuro Early Mobilization Protocol for this Doctor of Nursing Practice (DNP) project (Associates in Process Improvement, 2014). These models will be used to assist with gaining buy-in for process change, testing and re-testing the protocol, evaluating the protocol’s implementation successes, as well as barriers, and finally, disseminating the project findings (Engel, Needham, et al., 2013).

## CHAPTER 4: PROTOCOL REFINEMENT

### **Preliminary Work**

In October 2014, the original early mobility protocol, specifically for hemorrhagic stroke patients, was initiated. Prior to initiating any mobilization efforts in the NSICU, data were collected by the NSICU nursing administration and the clinical nurse IV (CNIV) (i.e. assistant nurse manager). Approximately 50 NSICU nurses were surveyed regarding their motivation to mobilize patients, their concerns regarding early mobilization, their self-reported time spent mobilizing patients on a daily basis, as well as their knowledge of the perceived benefits to mobilization in September 2014. This initial survey was completed by the nursing staff during a mandatory yearly educational day. The survey, although completed anonymously, was administered by the nursing leadership and results could have been affected by the fact the nurses were receiving training on mobilization during the educational day. Therefore, these factors could be limitations of the study and why the results indicate that the majority of nurses were “highly motivated” to mobilize the patients. The results of these preliminary findings are presented in Table 1, and will be discussed below.

Table 1. Pre-Mobilization Initiative Nursing Survey Results

	Not Motivated	Somewhat Motivated	Highly Motivated	Not Answered		
How motivated are you to mobilize your patients	1 (1.92%)	16 (30.76%)	27 (51.92%)	8 (15.38%)		
	Strongly Disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly Agree (SA)	Not Applicable (NA)
My patient is obese; my back will hurt or I may get injured mobilizing my patient	9 (17.30%)	16 (30.76%)	12 (23.07%)	11 (21.15%)	2 (3.84%)	2 (3.84%)
I do not have enough time on my shift to mobilize my patient	11 (21.15%)	23 (44.23%)	9 (17.30%)	7 (13.46%)	2 (3.84%)	---
I am afraid my patient will fall if I mobilize them	11 (21.15%)	26 (50.00%)	8 (15.38%)	7 (13.46%)	0 (0%)	---
I do not have enough help to mobilize my patient	8 (15.38%)	19 (36.53%)	14 (26.92%)	6 (11.53%)	4 (7.69%)	1 (1.92%)
It is not a nursing priority to mobilize patients, that is a PT/OT responsibility	25 (48.07%)	20 (38.46%)	2 (3.84%)	4 (7.69%)	0 (0%)	1 (1.92%)
My patient is comatose and will not benefit from early mobilization	17 (32.69%)	22 (42.30%)	6 (11.53%)	2 (3.84%)	3 (5.76%)	2 (3.84%)
	Yes	No	NA			
Do you feel you have the tools you need to safely move your patients?	46 (88.46%)	5 (9.61%)	1 (3.84%)			
Number of Benefits Listed	0	1	2	3	4	5
Number of nurses able to list the given number of benefits of early mobilization in the ICU	7 (13.46%)	2 (3.84%)	9 (17.30%)	12 (23.07%)	10 (19.23%)	12 (23.07%)

ICU: Intensive Care Unit; OT: Occupational Therapy; PT: Physical Therapy

Twenty-five out of 50 nurses who replied either strongly disagreed or disagreed, that they felt their patient was too obese or they would get injured as a result of mobilizing their patient. When asked if nurses felt they ‘did not have enough time to mobilize their patients’, 34 out of 52 nurses either strongly disagreed or disagreed with this statement, indicating they



have enough time to mobilize their patients as a typical patient assignment per nurse in the NSICU is 1-2 patients on average per shift, depending on patient acuity. Yet, when asked to quantify the amount of time spent mobilizing patients, nurses' self-reported time varied from zero minutes to 12 hours with the majority of nurses stating they mobilize their patients on average of 60 minutes per day (10 out of 32 respondents). Excluding extreme responses (those responses of zero minutes and over 90 minutes), 25 out of 32 respondents reported mobilizing their patients on average from five minutes to 90 minutes. A large majority of nurses did not fear their patient would fall during mobilization as indicated by 37 out of 52 either strongly disagreeing or disagreeing with the statement 'I am afraid my patient will fall if I mobilize them.' Only 10 out of 51 nurses agreed or strongly agreed that they did not have enough help to mobilize patients. When asked if nurses had the tools necessary to safely mobilize patients, 46 nurses stated "yes", and only 5 nurses stated "no," indicating that the majority of nurses felt as though they had the tools necessary to mobilize patients. An overwhelmingly 45 out of 51 nurses disagreed or strongly disagreed with the statement that it was not a nursing priority to mobilize patients, but rather PT/OT responsibility; meaning that the nurses did view mobilization as a nursing responsibility. When asked, "My patient is comatose and will not benefit from early mobilization," 5 out of 50 respondents either strongly agreed or agreed with this statement, yet patients who are in a comatose state may still benefit from early mobilization activities such as PROM and elevations in head of bed (Bassett et al., 2012; Klein et al., 2014; Morris et al., 2008; Titsworth et al., 2012). In addition, 7 nurses did not list any benefits to early mobilization, while only 12 out of the 52 nurses surveyed listed at least five benefits to early mobilization. Based on these results, nurses need further education on the benefits of early mobilization.

These preliminary results, along with the reviewed literature, suggest that a unit culture that supports mobilization is one in which there is enough staff support and resources to promote mobilization, and addresses the challenges of patient mobility in the NSICU, assists with ensuring mobilization success (Mulkey et al., 2014). Therefore this DNP project focused on education, encouraging teamwork, and fostering an NSICU culture centered on early mobilization.

Although the results of the Pre-Mobilization Initiative Nursing Survey found nurses where highly motivated to mobilize their patients, there are limitations to the survey results. The survey was administered during a mandatory training session, and responses could have been influenced by the nursing leadership that administered the survey. In addition, the survey was administered on a day in which education about mobilization was being provided. The fact that education was being offered could have also influenced the results of this survey increasing nurses' self-reported motivation to mobilize patients. Additionally, this survey was only administered to the nursing staff of the NSICU, the motivation of the CST, PT/OT, and RT staff to mobilize patients in the NSICU was not evaluated. In order to fully assess the effectiveness of an early mobility protocol, it is important to survey all members of the healthcare team.

Therefore, prior to implementing the revised Neuro Early Mobilization Protocol for this DNP project, the survey was revised and issued to the staff of the NSICU, including nurses, CST, PT/OT and RT to evaluate staff's opinion of mobilization, its benefits, and the protocol following the use of the Neuro Early Mobilization Protocol.

## **Implementation of the NSICU Mobility Protocol: Hemorrhagic Stroke**

Following the aforementioned mobilization survey, the NSICU Mobility Protocol: Hemorrhagic Stroke was implemented in the NSICU on October 2014. This protocol was designed by a nursing leader in the NSICU who sought input from members of a multidisciplinary team who met to finalize the piloted protocol to be tested on hemorrhagic stroke patients (aSAH and ICH) in the NSICU. The goal of this piloted protocol was to test the protocol on a limited number of patients in the NSICU to: (1) see if it was feasible to implement a mobility protocol in the NSICU, (2) evaluate the resources needed to support the protocol and (3) gain staff buy-in for the mobility initiative. Following a three month trial period, it was decided by the NSICU management and medical team to embark on expanding the project unit wide to encourage early mobilization for *all* patients in the NSICU. Therefore the ultimate purpose of this DNP project is to refine, implement and evaluate the Neuro Early Mobilization Protocol with multidisciplinary staff of the NSICU at UNC Health Care. This DNP project will use the PDSA Cycle to test the protocol for ease of use in order to make the protocol available to all NSICU patients regardless of diagnosis.

**Current Mobility Resources.** Since initiating mobilization efforts in October 2014, efforts have been made to increase mobilization resources available in the NSICU. Currently the NSICU has PT/OT staff to consult and evaluate neurological patients; however, the NSICU does not have dedicated PT and OT that staff the unit seven days a week. If a patient does not meet criteria for PT/OT treatment at the time of consultation, they are removed from the consult list until PT/OT are re-consulted at a more appropriate time by the NSICU team. Therefore, it was important to revise the protocol to allow for nurse led initiatives in order to encourage early mobility regardless of PT/OT availability.

Within the unit, there are two cardiac chairs and rooms are equipped with Hoyer Lifts. The unit is supplied with walkers, gait belts, and portable ventilators to assist with mobilization. Since nursing staff are trained on how to use these assist devices, the revised Neuro Early Mobilization Protocol was designed to guide nurses to advance patients as safely and as quickly as possible to the highest level of tolerated mobilization.

### **Protocol Refinement and Expansion**

In order to revise the original NSICU Mobility Protocol: Hemorrhagic Stroke, staff input was sought in order to gain feedback on how the original protocol could be improved for better understanding and ease of use. Key stakeholders involved in protocol refinement included those persons who participated in the development of the NSICU Mobility Protocol: Hemorrhagic Stroke protocol, the NSICU medical director, the CNIV for the NSICU, the Nursing Practice Council, the Neurocritical Care Team, the NSICU manager, the stroke coordinator, primary NSICU PT/OT, RT management, the NSICU RT specialist, and management of the NSICU sister units, the Intermediate Specialty Care Unit (ISCU) and 6 Neuroscience Hospital. Each stakeholder, or group of stakeholders, was met with individually to discuss the current protocol, need for possible revisions, and recommendations for revision based on current evidence from the literature (Bassett et al., 2012; Drolet et al., 2013; Engel, Tatebe, et al., 2013; Klein et al., 2014; Morris et al., 2008; Mulkey et al., 2014; Perme & Chandrashekar, 2009; Titsworth et al., 2012; Zomorodi et al., 2012).

The goals for refining the original protocol were to: (1) simplify the protocol to allow for ease of use, (2) make the protocol more generalizable to the population cared for in the NSICU, (3) receive feedback from those using the original protocol on ways to improve the

protocol and (4) ensure patients were properly screened for inclusion and exclusion in the protocol. As a result of these conversations the following changes were made to the protocol.

**Changes in Criteria for Exclusion from the Neuro Early Mobilization Protocol:**

1. Vital sign parameters were removed and exclusion criteria related to hemodynamic instability or vasopressor use was added.
2. Use refractory ICP elevation as an exclusion criteria as patients with EVDs and Camino monitors should be able to participate in some mobilization steps.
3. Licox catheters were added as exclusion criteria, as typically patients with Licox monitors suffer from severe TBI and would typically only benefit from PROM activities while the Licox monitor is in place (typically one week), during the acute illness period.
4. Pharmacologic paralysis was added as typically patients are paralyzed due to uncontrolled ICP, status epilepticus, or poor pulmonary status and would not tolerate mobilization beyond PROM.
5. Ventilation parameters were added to include positive end expiratory pressure (PEEP)  $\geq 8$  and fraction of inspired oxygen (FiO<sub>2</sub>)  $> 60\%$  as it was determined that many patients could benefit with increased head of bed positioning to improve pulmonary status.
6. Femoral sheath placement was added as several patients in the NSICU receive angiograms and have catheters in place and need to remain flat until they are removed, yet could still benefit from PROM activities.

7. Comfort care status remained as several of our patients progress to comfort care or withdrawal of support, and therefore would no longer benefit from mobilization efforts.
8. Brain death was not included in the exclusion criteria as a patient is declared legally dead after the declaration of brain death and would not benefit from early mobilization.
9. Unsecured aSAH was removed from the list of exclusions as some patients are angiogram negative, meaning there is no aneurysm identified on the first diagnostic angiogram, yet remain in the NSICU until follow-up angiogram in one week. It was determined that these patients should be treated like any other aSAH and limiting mobility would put these patients at greater harm. Should a patient be at risk for harm from mobilization due to their clinical presentation, the provider will remove the patient from the protocol.
10. Fractures were removed from the exclusion criteria as a single order could be written to not mobilize the involved extremity/extremities.
11. Patients with thoracic and lumbar spine fractures can still benefit from PROM activities and would have an order for bedrest until spines cleared by Neurosurgery.
12. Impulsive behavior, agitation and or unable to re-direct was also removed from the exclusion criteria as early mobilization has been shown to reduce delirium and anxiety (Klein et al., 2014). It was determined that education of staff would be more beneficial.

13. Pain was removed from the exclusion criteria as pain can be reduced with mobilization or appropriate pre-medication.

**Additional Revisions to Neuro Early Mobilization Protocol:**

1. Overall protocol was simplified and verbiage was reduced.
2. “Attempts” were removed as paper documentation was shown to be unreliable and underutilized.
3. Step numbers were re-organized.
4. Greater emphasis was placed on PROM exercises for all patients and added as Step 1.
5. Addition of family involvement with PROM exercises at Step 1.
6. Goals for mobilization were added to each step.
7. Safe and coordinated mobilization was encouraged by the healthcare team when mobilizing patients on ventilators.
8. Addition of marching for ten seconds if able, as some patients are unable to march in place due to neurological deficits, yet, can stand at bedside with assistance for ten seconds.
9. The addition of pivoting from bed to chair was added, especially for those patients who are hemiparetic.
10. Reassessment steps removed and re-directed back to exclusion criteria if patient did not tolerate mobilization.
11. Adverse events to monitor for during mobilization was added.

Once feedback was received from all stakeholders, a newly revised Neuro Early Mobilization Protocol was developed (Figure 1). All stakeholders were given one week to provide any

additional comments and feedback on the newly revised protocol. The protocol was then taken to a graphic designer to assist with further visual appeal. The final protocol was then disseminated to all stakeholders.



## Neuro Early Mobilization Protocol

### **Exclusion Criteria:**

- ☐ Acute decline in neurological status
- ☐ Refractory intracranial pressure (ICP) elevation
- ☐ Licox monitor
- ☐ Hemodynamic instability
- ☐ Hypotension requiring vasopressors
- ☐ Pharmacologic paralysis
- ☐ Mechanical ventilation with PEEP  $\geq 8$ , FIO<sub>2</sub> >60%, or APRV Mode
- ☐ Femoral arterial sheath in place
- ☐ Continuous Renal Replacement Therapy
- ☐ Comfort Care Status
- ☐ Documented provider order to exclude patient from protocol
- ☐ Continuous sedation that cannot be weaned. **Note:** If this is the only exclusion criteria present, may proceed through **Step 3** as tolerated.

**Are There Any Exclusion Criteria Present?** (If YES, go to **Step 1 and Assess Tolerance**; if NO, go to **Appropriate Mobility Step**)

- Any mobility stage can be bypassed or reverted back based on the clinician's assessment and/or the patient's tolerance.
- Assess patient tolerance during and after each mobilization step or as indicated.

### **Step 1: Range of Motion (Goal 2x/day)**

- ☐ Perform Passive Range of Motion (PROM) 10x in all four extremities
- ☐ Teach and encourage family member participation with PROM activities as patient will tolerate

### **Step 2: Head of Bed > 45° (Goal 2x/day)**

- ☐ Elevate HOB > 45° for up to 1 hour

### **Step 3: Bed in Chair Position (Goal 1 hour 2x/day)**

- ☐ Elevate bed to chair position with HOB > 60-65° for at least 1 hour
- ☐ May continue bed in chair position as tolerated with q2h turns

### **Step 4: Cardiac Chair (Goal 2x/day)**

- ☐ Transfer patient to cardiac chair for minimum of 1 hour as tolerated
- ☐ Patient may remain in cardiac chair with q1h turns, up to 4 hours, as tolerated

### Assess Tolerance

- ☐ Vital signs are within ordered parameters
- ☐ Stable or improved neurological status
- ☐ Minimal agitation or impulsive behavior
- ☐ If able to verbalize, patient verbalizes tolerance and agrees to proceed to next step.

If ALL tolerance questions are answered  
"YES," may proceed to the next step.

If ANY tolerance question is answered  
"NO," reassess patient in 12 – 24 hours  
starting with the exclusion criteria.

**Steps 2-4:**  
Assess tolerance at  
30 minutes x2, then q1h.

### **NOTE: Please verify active PT/OT orders.**

- Patient must be antigravity in at least one upper and one lower extremity to proceed with Steps 5-8, and ambulatory prior to admission in order to proceed with Steps 6-8.
- If patient is on a ventilator, obtain a "mobilize on portable ventilator" or "mobilize with ambu bag" order & coordinate safe mobilization with the healthcare team.
- Steps 6-8: Use hand-held assist, walker, gait belt or other assist devices as needed when mobilizing.

### **Step 5: Sit on Edge of Bed (Goal 20 minutes)**

- ☐ Assist patient to sitting with or without support (if able), and assess response
- ☐ Must be able to sit with 1-2 staff and assist with one lower extremity in order to proceed to Step 6

### **Step 6: Stand at Edge of Bed x 2 Minutes (Goal 2x/day)**

- ☐ Attempt to march in place for 10 seconds if able

### **Step 7: Ambulate or Pivot From Bed to Chair & Sit for 60 Minutes (Goal 2-3x/day)**

- ☐ If patient is unsteady during transfer, pivot the patient with assistance and proceed to chair
- ☐ If patient is unsteady during transfer do not advance to Step 8
- ☐ Reposition patient q1h while in chair

### **Step 8: Ambulate as Tolerated (Goal 2-3x/day)**

- ☐ Document distance walked and assist devices used during mobilization

### Adverse Events to Document

Please complete an incident report should any of the following events occur during mobilization:

- ☐ Fall
- ☐ Cardiopulmonary Arrest
- ☐ Removal of Medical Device:  
Endotracheal tube, tracheostomy, central line,  
external ventricular drain (EVD), PICCO  
monitor, arterial line, foley catheter, or  
nasogastric tube

Neuro Early Mobility Protocol: Updated 4/21/2015 MAB

Figure 1. Neuro Early Mobilization Protocol

## CHAPTER 5: METHODOLOGY

This quality improvement project aimed to evaluate the revised NSICU Neuro Early Mobilization Protocol. This is a descriptive study that examined qualitative content analysis and survey data. Specifically, the following questions were addressed:

1. What are the benefits identified by health care professionals (HCP) when implementing an early mobility protocol?
2. What are the challenges identified by HCP when implementing an early mobility protocol?
3. What tools do HCP indicate are needed in order to implement an early mobility protocol in the NSICU?
4. Did any adverse events occur during mobilization while implementing the revised early mobilization protocol?

Using a post-implementation survey, what feedback do HCP offer following use of the early mobilization protocol? Specifically the following questions will be addressed:

1. Was the protocol usable?
2. Following implementation of an early mobility protocol, was there a change in HCP beliefs regarding mobilization safety and the need for mobilization in the NSICU?
3. What did the HCP like about the Neuro Early Mobilization protocol?
4. What recommendations were offered by HCP for ways to improve the protocol for future use?

Approval to conduct this project was obtained from the Nursing Research Council (NRC) at UNC Health Care. This project was not considered research by the University of North Carolina's Institutional Review Board (IRB), and was exempt from review.

Following NRC review, a multidisciplinary team was created consisting of nursing champions from NSICU's Nursing Practice Council, nursing management, CST, PT/OT, RT and the Neurocritical Care Team. Using the PDSA cycle, project aims were set by the team (Institute for Healthcare Improvement, 2014). Interventions aimed at increasing staff buy-in and knowledge of the protocol were identified for implementation (**plan**).

All patients admitted to the NSICU during the summer months of 2015 were mobilized using the Neuro Early Mobilization Protocol (**do**). To identify the benefits, challenges, and tools needed to successfully mobilize NSICU patients, staff, including nurses, CST, PT/OT and RT were surveyed prior to and following project implementation. To evaluate the revised protocol, a post-implementation survey was administered to the staff following the protocol implementation.

Once the **study** period was completed, data obtained from the surveys was analyzed and barriers, tools needed, and challenges were identified, and analyzed for themes. To determine if there were any adverse events that occurred following protocol implementation, adverse events were documented via PORS reports. An adverse event was defined as any event that was unforeseen and put the patient's safety at risk. These events included any record of fall, cardiopulmonary arrest, unintentional extubation or tracheostomy removal, or removal of any medical device (EVDs, central lines, PiCCO monitors, arterial lines, nasal gastric (NG) tubes, and/or Foley catheters) which occurred during patient mobilization. All PORS reports filed by staff related to mobilization were reviewed by the nurse manager and

referred to the primary investigator (PI), after removing all identifying patient and staff information.

Based on the study findings (**act**), changes and recommendations for future study or protocol revisions were made. Finally, the results of the study were disseminated to the NSICU.

### **Setting**

This DNP project took place in the NSICU at UNC Health Care, a large academic medical center in the southeast United States classified as both a Level I Trauma Center and Comprehensive Stroke Center. The NSICU is a 16 bed ICU which is staffed by three Neurointensivists, a medical Fellow, eight Nurse Practitioners, Residents, and Medical Students who work closely alongside highly trained Critical Care Nurses, Nursing Management, CST, PT/OT, and RT.

The patients cared for in the NSICU at UNC Health Care, like many other NSICUs, typically suffer from stroke; ischemic, hemorrhagic, or aSAH, TBI, neuromuscular complications, spinal cord injuries as well as other neurosurgical and acute neurological injuries. A patient's eligibility to be mobilized using the Neuro Early Mobilization Protocol was determined by the nurses and/or PT/OT as part of their usual patient care. All patients admitted to the NSICU should have been mobilized within 24 hours of admission, unless the patient met criteria for exclusion as stated in the protocol.

### **Subjects**

The subjects for this project were the NSICU staff: nurses, CST, PT/OT, and RT. Therefore, a convenience sample consisted of NSICU staff that used the protocol during the summer months of 2015. The project participants came from a pool of approximately 60

Critical Care Nurses, 10 CST, 15 PT/OT, and 15 RT who staff the NSICU; totaling approximately 100 participants.

### **Educational Intervention Prior to Protocol Implementation**

Prior to the implementation of the mobility protocol, multidisciplinary staff education was delivered. Education for each discipline was tailored to each specialty and was decided upon based on recommendations from the management of each specialty.

**Nursing.** Nursing staff were informed at their monthly staff meetings regarding the mobility project. Nursing Practice Council members, staff champions, the CNIV and PI assisted with individualized nurse training guided by a Neuro Early Mobilization Training Binder (Appendix A: Key Training Points for Nurses). Additionally, unit mobility coaches taught staff the yearly safe patient handling material during protocol implementation to ensure safe patient handling techniques.

Mobility protocol reminders were placed on all computers as quick reminders to all staff of the protocol steps (Appendix B: Neuro Mobility Protocol Steps). Additionally, enlarged versions of the Neuro Early Mobilization Protocol along with the listed “Benefits of Early Mobilization” were posted in unit bathrooms (Appendix C: Benefits of Early Mobilization).

**Physical Therapy and Occupational Therapy.** A meeting was held by the PI with the team of PT/OT staff that primarily staff the NSICU to educate them regarding the changes to the protocol and answer questions about safely mobilizing patients in the NSICU, including patients with aSAH and PiCCO monitors. A short lecture was provided followed by a time for question and answer.

**Respiratory Therapy.** The RT team was trained by the NSICU clinical specialist. The RT clinical specialist and the PI met to discuss the finalized Neuro Early Mobilization Protocol and any educational points to discuss with the RT staff during training. The RT clinical specialist agreed to train her staff on the protocol, answer any questions the RT had about safely mobilizing patients, and assist with overseeing daily mobilization efforts for patients with RT needs.

**Clinical Support Technicians.** The CNIV and PI devised a plan for how to involve the CST in early mobilization efforts. An email communication was sent to the CST from the CNIV to communicate this practice change. CST were encouraged to assist with performing PROM, organizing a schedule to assist patients to cardiac chairs, and assisting patients to the edge of bed, chair or with ambulation. Additionally, the CST were in charge of updating each patient's mobility "step" and providing this information to the health unit coordinators (HUC) twice a day in order to update the patient bed board.

**Health Unit Coordinators.** The CNIV and PI formulated an email communication to the HUC to educate them about the revisions to the Neuro Early Mobilization Protocol and their involvement in the project. The HUC were asked to update the patient bed board twice daily to communicate to members of the multidisciplinary team the patient's current mobility step. Unit management and charge nurses were responsible for ensuring the bed board information was maintained.

**Nurse Practitioners and Neurocritical Care Team.** The NPs and the other members of the Neurocritical Care team were educated about the changes to the Neuro Early Mobilization Protocol at a staff meeting. Project purpose, protocol, and key points to remember during project implementation were discussed and all questions were answered by

the PI. The protocol and key points to remember during the Neuro Early Mobilization Protocol project implementation worksheet were posted in the NSICU workroom during project implementation as reminders to the staff. It was a unit wide goal that mobilization be discussed daily as a part of multidisciplinary rounds. Providers were asked to discuss the patient's current mobility progress with nursing daily during multidisciplinary rounds.

## **Measures**

**Early Mobilization in the NSICU Pre-Implementation Survey.** Surveys were administered to nurses, CST, PT/OT, and RT before and after protocol implementation. The pre-implementation survey evaluated staffs' fears about mobilization, self-reported time spent mobilizing patients, whether or not they felt mobilization was a priority, if staff felt as though they had the help and tools necessary to mobilize patients and if not, what additional tools would be required to mobilize patient's safely, as well as the perceived patient benefits to early mobilization. This survey was adapted from the initial survey that was given to nursing staff in September 2014 (Appendix D: Pre-Implementation Survey).

**Neuro Early Mobilization Protocol Evaluation Post-Implementation Survey.** To evaluate the usability of the Neuro Early Mobilization Protocol, a second survey was administered to staff to seek feedback on the Neuro Early Mobilization Protocol. The post-implementation survey included the questions regarding mobilization that were included in the pre-implementation survey as well as questions evaluating the ease of use of the protocol. Staff were asked if they understood the various components of the Neuro Early Mobilization Protocol, if they were confident in using the protocol, and if they routinely used the protocol when mobilizing patients. Specifically, participants were asked about their understanding of the exclusion criteria, the mobility steps, how to assess tolerance, and their confidence with

using the protocol. This survey also evaluated any barriers encountered when implementing the Neuro Early Mobilization Protocol into practice. Recommendations for ways to improve the protocol were also sought in addition to what staff liked most about the protocol. The post-implementation survey also collected demographic data from participants (Appendix E: Post-Implementation Survey).

**Adverse Events: Data Collection for Safe Mobilization.** To determine if there were any adverse events that occurred following implementation of the revised protocol, adverse events were monitored for and documented by the staff through the completion of PORS reports. The adverse events that were to be documented included those events that occurred during mobilization and included falls, cardiopulmonary arrest, or the removal of any of the following medical devices: endotracheal tube, tracheostomy, central line, EVD, PiCCO, arterial line, Foley catheter, or NG tube. A PORS report was to be filed according to hospital policy. Should the incident occur while mobilizing the patient, the unit manager would forward the report to the PI, who would review the PORS report with the NSICU medical director for significance. The PI requested the unit manager remove all patient and staff information from the report prior to forwarding the PORS report so that no identifying information was available.

### **Data Collection: Surveys**

Data collection occurred twice during project implementation and included two different surveys, the pre- and post-implementation survey. Both surveys were completed by nurses, CST, PT/OT, and RT. Surveys were administered either online through Qualtrics or through pen and paper surveys located in the staff breakroom.



For the electronic surveys, all emails to participants were sent directly through Qualtrics and included anonymous survey links that could only be used by the participant and would become inactive once the participant completed the survey or the survey closed. Once the participant had completed the survey, the participant was directed to a second survey through Qualtrics in which the participant could enter his/her name to be entered into a drawing for an incentive for survey completion, however the survey responses would remain anonymous. A follow-up email reminder was sent out through Qualtrics to staff who had not completed a Qualtrics survey as a reminder to complete the survey. This email included the Qualtrics link to the survey and a calculated survey completion rate.

Pen and paper copies of the survey were located in the NSICU breakroom in an envelope marked “NSICU Mobilization Surveys.” An envelope to return the completed NSICU mobilization surveys was also located in the NSICU break room. Additionally, paper survey completion slips and a separate envelope marked “Completed Survey Completion Slips” was in the NSICU breakroom to allow participants who completed pen and paper surveys to enter his/her name into the drawing for the incentive for survey completion. Surveys were also made available during NSICU staff meetings in order to increase return rate.

**Survey Recruitment.** Participant recruitment primarily occurred through emails sent to the NSICU staff. However, additional recruitment efforts took place at NSICU staff meetings. A current list of NSICU staff members/participants was provided by management of each department, including participant email address of those individuals that staff the NSICU on either a full-time or part-time bases so that surveys could be administered anonymously via Qualtrics. Once project approval was granted, a finalized list of

participants was confirmed with each manager to ensure an accurate list of participants who would be staffing the unit during the project implementation. A similar email was sent out to management prior to the post-implementation survey confirming whether or not there had been any additional staff hired. There were some participants lost to follow-up due to staff turnover and additional staff were hired midway through project implementation. The participant list was updated accordingly based on staffing changes.

**Confidentiality of Participant's Identity.** Confidentiality was maintained at all times while collecting data during this study. Staff names (first name and last name) as well as hospital email address were obtained in order to send out survey links and email communications with staff members in the NSICU. This information was kept secure at all times and verified during project implementation via a password protected computer. No identifying information was collected on the staff surveys.

**Anonymity of Data.** All surveys of staff members did not elicit any identifying information so that all surveys could be completed anonymously. Participants created a unique code during survey completion for both pre- and post-implementation surveys, for tracking purposes that was used to compare the pre- and post- survey data. This was used to evaluate for a change in beliefs about mobilization following protocol use and education (Damrosch, 1986).

**Incentives.** Incentives were offered to staff to encourage project participation and survey completion. Participants were given the opportunity to complete a survey completion slip following both the pre- and post-implementation surveys by entering his/her name into a drawing for one of ten, \$5.00 Starbucks gift cards. Recipients of the Starbucks gift cards

were notified individually via email following the completion of each survey. An additional incentive was provided to staff during staff meetings at project completion.

### **Data Analysis**

Demographic data was collected from the HCP including the HCPs experience in the NSICU, overall experience, and which shift the employee worked (day, night, or weekend). Descriptive statistics were used to describe the study sample.

**Qualitative Analysis.** A content analysis of written responses on the survey was completed by the PI to identify benefits of early mobilization, tools required for safe mobilization, challenges that occurred during protocol implementation, what the participants liked about the protocol, and ways in which the protocol could be improved and used more effectively in future practice. Responses from the pre- and post-implementation surveys were organized in a Microsoft Excel document, read in entirety, and grouped into meaningful categories to develop for themes related to tools, challenges, and benefits to early mobility.

**Survey Responses and Adverse Events.** To determine if there was a change in HCP beliefs regarding mobilization following education and use of the an early mobilization protocol, results from the pre- and post-implementation survey were analyzed using descriptive statistics and the “R” statistical software, a language and environment for statistical computing (R Core Team, 2015). Since participants created a unique identifying code during the pre- and post-implementation survey, a paired t-test was used to evaluate the participants’ response to the intervention, evaluating for a change in opinion regarding mobilization following protocol implementation.

To address knowledge of the mobility protocol, the frequency, mean and standard deviation for all groups (nursing, CST, PT/OT, and RT) was compared and analyzed for all surveys completed.

To address adverse events, a frequency analysis of events that occurred during protocol implementation was conducted.

## CHAPTER 6: RESULTS

### Response Rate

**Pre-Implementation Survey Participation.** For the pre-implementation survey, 69 out of a possible 82 participants completed the survey. Of the 69 participants, 61% were nurses, 13% CST, 13% PT/OT and 13% RT.

Table 2. Pre-Survey Participant Distribution

	RN	CST	PT/OT	RT	Total
<b>Participant Distribution</b>	42/51 (82%)	9/9 (100%)	9/12 (75%)	9/10 (90%)	69/82 (84%)

CST: Clinical Support Technician; OT: Occupational therapy; PT: Physical therapy; RN: Registered nurse; RT: Respiratory therapy

**Post-Implementation Survey Participation.** For the post-implementation survey, 58 out of a possible 79 participants completed the survey. Of the 58 participants, 60% were nurses, 12% CST, 14% PT/OT and 14% RT.

Table 3. Post-Survey Participant Distribution

	RN	CST	PT/OT	RT	Total
<b>Participant Distribution</b>	35/47 (74%)	7/8 (87%)	8/14 (57%)	8/10 (80%)	58/79 (73%)

CST: Clinical Support Technician; OT: Occupational therapy; PT: Physical therapy; RN: Registered nurse; RT: Respiratory therapy

**Survey Matching for the Pre- and Post-Implementation Surveys.** There were 34 participants that completed both the pre- and the post-implementation surveys. Of the 34 participants completing both surveys, 61% were nurses, 12 % CST, 12% PT/OT and 15% RT.

**Experience.** The staff in this NSICU came from a wide range of experience levels. The majority of all staff had been practicing within the range of 2-5 years for their profession. The majority of nurses (24/35), have been working in the NSICU for 1-5 years, with all nurses reportedly working in the NSICU for less than 15 years. However, overall experience of nurses working in the NSICU ranged from less than 1 year to forty years. These findings are consistent with the representation of critical care nurses practicing in the United States (American Association of Critical-Care Nurses, 2015). The majority of CST, 3/7, had been working in the NSICU for 3-5 years, however, 2/7 of the CST had been a CST for 6-10 years. PT/OT came from a wide range of professional background with the majority of PT/OT, 5/8, practicing for 2-5 years, however, 2/8, reported practicing for 11-15 years. Yet, 3/8 PT/OT reported having less than 1 year of NSICU experience. Of the RT practicing in the NSICU, 5/8 have been in the NSICU for 1-2 years. One RT had 6-10 years of experience as an RT, while another had 31-40 years' experience as a RT.

**NSICU Staff Scheduling.** The majority of the nursing respondents worked day shift (n = 12), along with RT (n = 6). PT/OT equally worked weekdays and weekend days. CST were rather equally distributed between days and nights.

### **Benefits to Early Mobilization**

As part of both the pre- and post-implementation survey of the Neuro Early Mobilization Protocol, staff were able to identify benefits to early mobilization. Table 4 lists the benefits of mobilization identified by the staff of the NSICU, ranked according to the number of times staff identified each benefit based on the general themes listed, and provides examples listed by staff.

Table 4. Top Ten Identified Benefits of Mobilization Listed by Staff

<b>Overall Topics in Rank Order</b>	<b>Examples of Benefits Listed</b>		
<b>Improves Pulmonary Status</b>	“Reduce ventilator days”	“Prevent Pneumonia”	“Mobilization of Secretions”
<b>Decreases Length of Stay</b>	“Decrease ICU stay”	“Decrease hospital stay”	“Early discharge”
<b>Improves Strength</b>	“Increase muscle strength”	“Decrease muscle atrophy”	“Maintain muscle strength”
<b>Reduces Delirium</b>	“Prevent delirium”	“Decreased ICU psychosis”	“< confusion”
<b>Prevent Skin Breakdown/Pressure Ulcers</b>	“Pressure ulcer reduction”	“Reduction in wounds”	“Decrease risk for skin breakdown”
<b>Decreases Infection</b>	“Decreased risk of infection”	“Decrease Infection”	“Decrease infection rates”
<b>DVT Prevention</b>	“Decrease risk for DVT”	“Prevent blood clot”	“Decrease risk for blood clot due to immobilization”
<b>Cardiovascular Effects</b>	“Improved circulation”	“Better circulation”	“Improved CV function”
<b>Increased Awareness</b>	“Promotes alertness in patients”	“Arousal and alertness”	“Improves patients awareness”
<b>Motivation</b>	“Gives patients a sense of accomplishment that they did something”	“Motivation to get better and go home!”	“Increase hope in best outcomes”

CV: Cardiovascular; DVT: Deep Vein Thrombosis; ICU: Intensive Care Unit

### **Challenges to Implementation**

Although many staff members did not report any barriers to implementation of the Neuro Early Mobilization Protocol, when asked “My biggest challenge when using the Neuro Early Mobilization Protocol,” the top challenges reported by staff included lack of assistance, time, and concern for mobilizing complex patients attached to monitors, ventilators, and concern for safely mobilizing the patient and whether or not the patient

would tolerate mobilization. Specifically one staff member found it challenging “having the time AND help at the same time in between meds, assessments, and procedures.” Another found it challenging “understanding when mobilization was appropriate with so many patients vented and hooked up to everything, [he/she] wasn’t sure if it was safe for them.” Night shift staff struggled to find enough time and assistance to mobilize their patients. Additionally, communication amongst the various disciplines was also reported as a barrier to successful mobilization. One staff member from PT/OT reported “pushback from nursing staff about who will get a particular patient back to bed. If nurses are expected to mobilize more under the protocol, they need to be able to return a patient to bed once therapy has mobilized them.” Another documented concern was incomplete communication and documentation about how much assistance was required during mobilization, and the impact of this on patient and staff safety. Sedation was also identified as a challenge. Although one particular staff member said “the protocol was good, but sedation was a huge barrier. Even when it could be weaned, some RNs weren’t as willing to do that.” Staff also reported time was required to learn the protocol, including the exclusion criteria and steps. Mobilizing obese patients and documentation was also a reported challenge.

### **Tools Requested to Implement Protocol**

As part of the pre-implementation survey, staff were asked to identify tools needed to implement the protocol. Mobilization equipment, such as walkers, standing frames, gait belts, maxi slides, slings, lifts and cardiac chairs were requested. In order meet these requests and thus increase buy-in for project implementation, the PI met with nursing leadership on the unit. While the unit had the majority of the requested supplies, it was not in one central location. It was decided to create a centralized “mobilization station.” The



mobilization station was designed so that staff would be able to obtain all the mobilization supplies required for mobilization from one location. All the supplies were clearly labeled and each day the HUC were asked to verify that supplies were ordered from central supply, should material run out. Unfortunately, the unit did not have the funds nor the storage to secure an additional cardiac chair prior to initiating this project. Therefore, it was decided that the CST would be utilized to assist with designing a schedule to assist with mobilizing those patients who would need to be mobilized to a cardiac chair each day. On the CST's assignment sheet, mobilization was added to their list of assignments each day, and the CST were to work with the nursing staff to help coordinate mobilizing patients to cardiac chairs, when appropriate, in order to work with the supplies the unit already had. All efforts were made in order to provide the staff with the needed supplies to safely mobilize patients in the NSICU using the Neuro Early Mobilization Protocol. The supplies that were able to be obtained for the mobilization station included the following: two gait belts, one walker, shorts, sliding board, maxi slides, chair slings, and a cardiac chair placed on each side of the unit, one of which was located at the mobilization station.

Following protocol implementation, staff requested equipment including gait belts, walkers, slide sheets, maxi slides, and an additional cardiac chair. Additionally, charging the lifts in the room was a challenge encountered during project implementation. Greater staffing and improved communication amongst team members was also encouraged to improve mobilization.

## **Adverse Events**

There were no documented adverse events that occurred during mobilization of patients during the implementation of the Neuro Early Mobilization Protocol. There were no completed PORS reports by the staff of the NSICU that addressed any patient safety concerns, falls, removal of any medical devices or cardiopulmonary arrest that occurred during mobilization. Per the unit manager, the reports that were filed during the protocol implementation time period did not occur during mobilization activities.

## **Protocol Usability**

Findings from the post-implementation survey revealed that staff in general understood the protocol, the exclusion criteria, mobilization steps, how to assess tolerance during and after mobilization and routinely used the protocol when mobilizing patients in the NSICU. Additionally, there was strong managerial support of using the Neuro Early Mobilization Protocol when mobilizing patients as indicated by the majority of staff strongly agreeing with the statement, “My manager supports my efforts in using the protocol.”

Table 5 breaks the post-implementation mobilization protocol data up into responses by specialty. Although the mean scores were rather close amongst all disciplines, on average, PT/OT’s mean scores were the highest overall. Nurses, scored highest in understanding the exclusion criteria, while CST scored highest in their confidence in using the protocol to safely mobilize patients in the NSICU.

Table 5. Post-Implementation Survey—Neuro Early Mobilization Protocol Data by Specialty

	I understand the exclusion criteria				I understand the mobility steps				I understand how to assess tolerance during and after mobilizing my patients			
	RN	CST	PT/OT	RT	RN	CST	PT/OT	RT	RN	CST	PT/OT	RT
<b>Mean</b>	3.4	2.714	3.375	3.25	3.371	3.143	3.5	3.25	3.4	3.286	3.625	3
<b>S.D.</b>	0.553	0.756	0.916	0.463	0.646	0.378	0.535	0.463	0.497	0.756	0.518	0.535

	I am confident in using the protocol to safely mobilize my patients				I routinely use the protocol when mobilizing my patients				My manager supports my efforts in using the protocol			
	RN	CST	PT/OT	RT	RN	CST	PT/OT	RT	RN	CST	PT/OT	RT
<b>Mean</b>	3.314	3.571	3.5	2.875	3.171	3.286	3.75	2.75	3.429	3.571	3.875	3.125
<b>S.D.</b>	0.583	0.787	0.535	0.641	0.707	0.756	1.165	1.165	0.558	0.535	0.354	0.641

CST: Clinical Support Technician; OT: Occupational therapy; PT: Physical therapy; RN: Registered nurse; RT: Respiratory therapy; S.D.: Standard Deviation

### Change in Beliefs Regarding Mobilization

A paired t-test was completed for 34 participants who completed both the pre- and the post-implementation survey. These results are available in Table 6.

Table 6. Paired t-test Results (n = 34)

	Mean for Pre	Mean for Post	Mean Difference	p-value
I may get injured	2.294	2.147	0.147	0.201
<b>I don't have enough time</b>	2.412	2.088	0.324	<b>0.032</b>
I am afraid my patient will fall	2.206	2.030	0.152	0.231
<b>I do not have enough help</b>	2.441	2.265	0.176	<b>0.032</b>
It is not a priority	1.844	1.941	-0.063	0.645
<b>My patient is comatose and will not benefit</b>	2.235	1.824	0.412	<b>0.011</b>

Significance set at  $p < 0.05$

### What Staff Liked About the Protocol

When asked “What I like most about the Neuro Early Mobilization Protocol” the majority of staff reported that they liked to see the patients progress, that the protocol was “simple and easy to use”, the protocol motivated staff to mobilize their patient’s and created

greater team work. Staff found it “rewarding” to see patients get out of bed. One staff member stated, “I like to see my patients’ progress from Step 1 to 8.” Staff also reported that they felt that the patients appeared more alert following mobilization and were leaving the NSICU sooner. One OT stated “It’s helping change the culture in the ICU. The question shouldn’t be when can we move them? It should be, why aren’t we moving them?” Many staff members reported the protocol was easy to use and easy to follow and one staff members stated it “applies well to the Neuro patients.” One staff member even said the protocol gave him/her “more motivation to mobilize [his/her] patients and also supplies an outline and goals to achieve for the patient.”

### **Recommendations for the Future**

Although there were many comments from staff that mobilization efforts had improved following implementation of the protocol, there were many good suggestions for how to improve mobilization efforts in the future. One suggestion was to “post the steps for mobilization and the criteria for exemption somewhere in clear view at the nurse’s station.” Another suggestion was to post a “sign in the patient’s room stating it was safe to implement the mobilization protocol.” In addition, posting mobilization and activity goals for patients to achieve each day was also recommended. Continuing to emphasize that early mobilization is important for every patient was another recommendation, and if a patient is unable to be mobilized, then a “huddle” should occur or discuss with management why the patient was not being mobilized to prevent any negative attitudes toward early mobilization. The night shift requested a “schedule or time for mobilization to occur.” Additionally, staff requested a report to know the outcomes and benefits of early mobilization including the number of successful extubations, reduction in wounds, and if there was an increase in falls as a result

of mobilization. There was also a recommendation to identify nursing mobility champions on the unit to assist with mobilizing the various types of patients on the unit to help other nursing staff with mobilization so there would be less reliance on PT/OT to get challenging patients back to bed after PT/OT has worked with them. One staff member also requested “potentially more options for comatose patients.”

Other recommendations specific to this institution included obtaining more staff, more resources and working supplies for mobilization, increasing communication amongst team members, and encouraging better teamwork amongst the staff to ensure mobilization.

## CHAPTER 7: DISCUSSION

### **Conceptual Framework**

Although the conceptual framework initially selected for this project was the PDSA Cycle, primarily used to implement rapid change, upon completion of this project, it became evident that the PDSA Cycle may not have been the best model to choose for the overall implementation of the Neuro Early Mobilization Protocol. Although the PDSA Cycle was useful for refining the protocol itself, in gathering feedback from the stakeholders, making changes to the protocol, and preparing the protocol for implementation, once the protocol was refined, the protocol was ready for testing. As it turned out, upon testing, there was very little feedback from the NSICU staff on ways in which the protocol itself could be improved for future use; which was initially anticipated during project design. Rather, theories on process change and outcomes research, like Kotter's 8-Step Process for Leading Change or Donabedian's recommendations for process change and outcomes research, could have provided better guidance when implementing the Neuro Early Mobilization Protocol along with sustaining the use of the protocol following termination of the project time period (Donabedian, 2005; Kotter, 2012)

### **Response Rate**

Overall staff participation for the surveys were high, (84% pre-implementation and 73% post-implementation, respectively). This could have been due to the fact that surveys were made available in multiple means (the breakroom, at staff meetings, and electronically via Qualtrics). Reminders were also sent to staff during project implementation and

management encouraged staff to participate. Staff were also incentivized to participate by offering Starbucks gift cards for survey completion for both the pre- and post-implementation survey. Additionally, the PI of this project was employed on the unit and encouraged staff to participate in the project to gain feedback. All factors contributed to an overall high survey response rate.

Staff turnover did occur during this project. Seven nurses left during project implementation, while three new nurses were hired. One CST transferred during the project implementation. There was no RT turnover, however PT/OT had one therapist leave and three were added during protocol implementation. This turnover was largely due to the fact a new sister hospital opened in the area and many staff members left to pursue further educational offerings and career paths, which can be typical for the ICU. PT/OT were increasing their cross coverage of the NSICU, and therefore additional staff coverage was added.

In general, however the NSICU staffing model is representative of many other ICU models based on levels of experience as well as how the unit is staffed with typical two to one patient to nurse ratios. This NSICU, under the direction of a dedicated Neurointensivist and Nurse Practitioner model, has only been up and running since 2010. This could make up for the reason why many staff members have only been working in this NSICU for less than five years.

### **Protocol Usability**

In general, all HCP understood the Neuro Early Mobilization Protocol from the exclusion criteria, to the mobilization steps, to how to assess tolerance during and after mobilization and finally how to safely mobilize patients using the protocol. Nearly 75% of

HCP reported routinely using the protocol to mobilize their patients. The greatest impact for the implementation success of this protocol was managerial support. From the start of this project, nursing, CST, RT, and PT/OT leadership as well as physician support strongly encouraged the use of the Neuro Early Mobilization Protocol. In order to have successful staff buy-in, leadership at all levels must support not only the staff, but drive change to ensure success.

When the results of the post-implementation survey responses evaluating the Neuro Early Mobilization Protocol were broken down into specialty (Table 5), various themes were identified, which can be expected findings when comparing the various roles and how each role brings various expertise when using the Neuro Early Mobilization Protocol. Although the differences between groups were minor, in general, PT/OT tended to score the highest in understanding the mobility steps, how to assess tolerance, and protocol usage. Which, being PT/OT, mobilization is their specialty and knowing how to safely and effectively mobilize patients is an important part of their role in the NSICU. Nurses scored highest on understanding the exclusion criteria. Since the exclusion criteria included specific criteria to identify patients in the NSICU who would not tolerate mobilization, especially early on in their hospitalization, it is no surprise that NSICU nurses would better understand this criteria over the other specialties based on their overall experience. CST scored highest on their confidence to safely mobilize patients using the protocol. This may be due to the fact that CST are primarily involved in mobilizing patients with a team of HCP and therefore feel confident when mobilizing patients with a team. Otherwise, the CST may assist with mobilizing more stable patients in the NSICU with less risk involved.



Compared to the other HCP, RT was the least confident with using the protocol to safely mobilize patients and were least likely to routinely use the protocol to mobilize patients in the NSICU. This could be due to the fact that RT would only mobilize those patients who were ventilated, were going to be placed in a cardiac chair, or where going to be mobilized while intubated or trached, and were therefore required to assist with managing the patient's airway. Although actions such as those listed did occur during this project, ventilated patients were not always mobilized out of bed on a daily basis. Allowing RT time to get comfortable with the protocol, along with greater education about the long-term benefits to mobilization, including the potential for limited patient progression while in the NSICU, could lead to better understanding and protocol use.

PT/OT on average had the highest scores on the post-implementation survey. Despite having the overall highest scores in the post-implementation survey, PT/OT as well as the CST were least likely to understand the exclusion criteria. The exclusion criteria of the protocol, although designed by a multidisciplinary group of HCP working in the NSICU, is a specific set of exclusion criteria for this particular patient population. Although education was provided on the protocol to all groups, it is clear that additional education for these groups is required. Neither of these groups participate during daily rounds on the patients in the NSICU, like nursing and RT. Finding a way to improve communication with these HCP on a daily basis is important to ensure that accurate information is communicated to all members of the team. Additionally, implementing and educating mobilization champions from each specialty to act as resources for each group could also improve understanding and allow for further assistance as questions arise.

Of all the groups, RT and nurses were identified as the two groups least likely to use the protocol to guide mobilization. Although mobilization was being discussed daily on rounds and this protocol was being used to guide mobilization in the NSICU, it is unclear how often the protocol was actually being used to guide mobilization. In order to adequately assess protocol usage, further study would be required. One way to improve usage would be to revise the electronic medical record (EMR) so that documentation reflects the protocol. By incorporating the protocol into the EMR, protocol usage could increase.

### **Benefits to Early Mobilization**

In general, staff were able to identify many of the benefits of early mobilization. Of all the benefits of early mobilization identified by the NSICU staff, pulmonary benefits were recognized most often as the greatest benefit to early mobilization. Not only did staff distinguish that patients experienced fewer ventilator days, but staff also documented a reduction in pneumonia and patients ability to mobilize secretions as a result of early mobilization. One can assume that bed positioning for ventilated patients had the greatest impact on outcomes by increasing the head of bed position from 30 degrees, to 45 degrees, to bed in chair position (60-65 degrees), and eventually placing the patient into the cardiac chair. Positioning potentially provides pulmonary benefits and allows for greater pulmonary toileting (Titsworth et al., 2012).

Next, staff identified a reduction in ICU LOS as another benefit to early mobilization. Mobilization is a simple intervention that can have a significant impact on physical and mental outcomes. Improving patient's strength, reducing delirium, increasing awareness, giving the patient motivation to get better, and increasing both patients and families satisfaction with their hospital stay were all benefits identified by staff. Staff also recognized

a reduction in skin breakdown, pressure ulcers, infection rates, DVT, and improved circulation as a result of early mobilization. Benefits identified by NSICU staff are similar to those findings in the literature (Engel, Tatebe, et al., 2013; Klein et al., 2014; Morris et al., 2008; Needham & Korupolu, 2010; Needham et al., 2010; Schweickert et al., 2009; Titsworth et al., 2012). Through successful staff education and motivation, the ability of the staff to recognize these multiple benefits may have contributed to the successful implementation of the Neuro Early Mobilization Protocol.

### **Adverse Events**

During implementation of the Neuro Early Mobilization Protocol, no adverse events occurred while mobilizing patients in the NSICU. Although there was hesitation by staff to mobilize some patients, patients were mobilized without the removal of endotracheal tubes, tracheostomies, or EVDs. Patients in the NSICU are in various conditions that require close monitoring during mobilization. However, staff need to be aware these patients are still ICU patients, and thus, receiving ICU level of care. By closely following the exclusion criteria outlined on the protocol, monitoring for any changes in patient's condition prior to mobilization, as well as any acute changes that may occur during mobilization, staff in the NSICU can take the necessary steps needed in order to mobilize patients under optimal conditions.

### **Change in Beliefs Regarding Mobilization**

Of the 34 participants who completed both the pre- and post-implementation surveys, as demonstrated in Table 6, following the implementation of the Neuro Early Mobilization Protocol, HCP had a significant change in their beliefs about mobilization when it came to staff having enough time to mobilize patients, having enough help, and the benefits that

mobilization provided comatose patients. This significance could be due to the clear benefits that were identified by participants in the study. As indicated in the results, several participants identified the need for early mobilization to become a part this unit's culture. By addressing the concerns of staff, especially those concerns related to safety, motivation to mobilize patients may increase. Several interventions to address unit culture were addressed in this study that could explain the significance in motivation including reinforcement and education for early mobility, development of a mobilization station where resources could be centrally located, establishing PT/OT consults on all patients at admission, or as soon as providers saw fit, and reinforcing that no adverse events occurred as a result of patient mobility. As a result, early mobility is becoming a routine intervention in NSICU practice.

Although not experienced by all participants of this study, those participants that completed the pre- and post-survey credited a greater amount of assistance when mobilizing patients following the implementation of the Neuro Early Mobilization Protocol (Table 6). Whether it was a heightened awareness of the benefits of mobilization, the awareness of the study, or true teamwork impacting the HCP efforts to mobilize patients, HCP felt as if they had more help with mobilizing patients following the implementation of the protocol.

### **What Staff Liked About the Protocol**

The intent of the Neuro Early Mobilization Protocol was to be a simple, easy protocol that staff could be use on all patients in the NSICU. Patients in the NSICU are complex with multiple disease processes and deficits that can experience various complications as a result of their disease processes. The purpose of the Neuro Early Mobilization Protocol was that the protocol could be used on any patient in the NSICU during their stay in the NSICU, and eventually, during their hospitalization; hence the reason the protocol was designed with

eight steps from bedrest to ambulation. The steps were designed to be easy to follow and provided daily goals to encourage mobilization.

Staff reported that the protocol was simple and easy to use and it motivated the staff to mobilize their patients. In general, the protocol was appropriate for use with this particular patient population. When implementing the Neuro Early Mobilization Protocol, there was an observed change in culture in the NSICU, with staff working together more to mobilize patients. They were no longer trying to keep their patients in bed, but rather asking providers, “Why can’t we mobilize this patient?” The Neuro Early Mobilization Protocol in general was well received by the staff with little input following implementation for ways to improve the protocol for future use.

### **Challenges to Implementation**

Although staff were able to identify many of the benefits to early mobilization and liked using the Neuro Early Mobilization Protocol, there were some challenges that staff did encounter when implementing the protocol. When mobilizing more complex patients, those who remained ventilated, with cerebral monitors, and had severe neurological defects, this protocol does require staff to work together as a team, to plan ahead, in order to make mobilization a priority for these patients, especially if mobilizing these patients at or beyond Step 4. Finding the time, assistance, and knowing if it was really “safe” to get the patient out of bed was a concern by staff as it did require a lot of resources for the staff to mobilize the patient, especially if the staff feared the patient would not tolerate placement in the cardiac chair for longer than one hour, the recommended time for mobilization. Posting the protocol along with an example of a mobilization schedule in the patient’s room and at the nurse’s station are two interventions that might improve mobility implementation and assist nurses

with addressing the challenge of time management for mobilizing. Additionally guidelines for how many team members might be needed to move the specific patient, might help with planning of team activities and increase security by staff when moving patients.

Staff identified the need for improved communication, especially in regards to who would be responsible for putting patients back to bed following mobilization and how much assistance was required during mobilization. These findings are consistent with the literature (Clark et al., 2013). Clear communication is essential, especially in the ICU setting. Daily handoff tools and proper documentation are needed to reduce the risk of injury to staff but also prevents possible injury to the patient (Titsworth et al., 2012). Communication between staff members, as well as safety of the patient and staff are major concerns for any early mobility protocol, and future work should focus on training staff in team building, communication, and planning to implement mobility activities.

Night shift struggled with when was the most appropriate time to mobilize patients. Due to the pathophysiology of neurological injury, rest and recovery are important aspects of nursing care. Thus, it is difficult to balance time to rest with neurological examinations and other nursing interventions. In order to allow patients the opportunity to sleep at night, mobilization efforts should optimally not be occurring between the hours of 2200 and 0400. However, head of bed positioning (Steps 2-3) or those patients requiring minimal assistance to ambulate to chair or around the unit (Steps 7-8), can occur during night shift hours, as tolerated, which would allow for patient mobility to occur, and balance the need for patient rest, low staffing, and other challenges identified by the night shift. Further education on timing of interventions to maximize rest with mobility is recommended for future work to address this concern.

Sedation was mentioned as a barrier to implementation, however in the NSICU, minimal sedation is used at all times in order to follow patient's neurological status unless a patient is unable to be weaned from sedation due to poor pulmonary status or sedation is being used to control ICP or status epilepticus. Sedation for ventilated patients, primarily Propofol, is held every hour or two hours to assess neurological status, and again is used sparingly in order that neurological status can be closely monitored. Since sedation is kept to a minimum in order to assess neurological status, sedation should not have been a barrier to early mobilization efforts as has been seen in the literature (Needham et al., 2010). Further education about sedation for the neurological patient and its impact on patient mobility should be reinforced in future work.

Additional staffing was still requested by several staff members to ensure successful mobilization efforts. Many studies have found by implementing mobilization teams or early PT/OT have led to improved patient outcomes, shorter ICU and hospital stays, and more ventilator free days, yet did not increase costs as a result of implementing such teams due to the overall patient benefits achieved (Engel, Tatebe, et al., 2013; Morris et al., 2008; Needham & Korupolu, 2010; Needham et al., 2010; Schweickert et al., 2009). This NSICU does not currently have a full time PT/OT that staff the NSICU. Although PT/OT is consulted, by obtaining a full-time PT/OT dedicated to the NSICU, this provider could assist with mobilizing patients, educating NSICU staff, creating a mobilization team of specialists (nurses, CST, and RT) to become the "mobilization experts" for the unit, and assist with assessing and guiding patient mobilization efforts on a daily bases in the NSICU. By having a PT or OT expert focused on early mobilization who could oversee daily mobilization efforts, resource allocation could be better assessed, teamwork could be coordinated for

challenging patients, and greater education could be provided to all staff members on the NSICU. Having one person responsible to oversee daily mobilization could greatly impact the overall culture of the unit and impact the care provided in the NSICU.

Whether it be concerns about the time and amount of assistance required for safe mobilization, communication challenges encountered between disciplines, mobilization efforts at night, sedation, and the need for additional staffing, there were challenges that staff did encounter when attempting to mobilize patients in the NSICU. However, these are challenges that can be overcome with creative thinking, education, and continued efforts to improve teamwork and communication.

### **Limitations**

No study is without limitation. This study was completed at a single academic center with 16 NSICU beds, which could impact generalizability, yet demographics support national trends. The purpose of this study was to evaluate the protocol itself, thus further study is needed to address the impact of this protocol on patient outcomes.

The PI for this study was an advance practice provider working on the unit at the time of project implementation, and could have influenced the results of this study. However, being a team member on the unit allowed for greater understanding of the challenges encountered when attempting to implement the Neuro Early Mobilization Protocol into the NSICU setting.

The reports that were filed through PORS during the protocol implementation were reviewed only by the unit manager, and the PI of the study did not have access to the PORS reports to determine if an incident should have been considered an adverse event resulting from early mobilization. Additionally, although staff were trained about what to monitor for



during protocol implementation in regards to adverse events to report, the only way to monitor adverse events was through the completion of PORS reports. There is a chance that PORS reports were not completed, thus allowing for events to not be captured.

The only adverse events that were monitored for during this study were risks to patients. However, it was brought to the PIs attention during survey completion that one staff member did sustain a self-reported injury to his/her shoulder as a result of mobilizing a patient, whom he/she thought according to documentation required less assistance than was actually required. For future study, monitoring for all adverse events, including the potential for harm to both patients and staff members would be necessary to adequately assess safety when using the Neuro Early Mobilization Protocol.

The pre- and post-implementation survey tool was not a validated tool and was designed base on the prior survey the unit had distributed to the nurses in September 2014. This survey was initially created by nurses on the unit to assess fears and resistance to mobilization. Additional questions of interest were added to assess staffing needs and other questions of interest around mobilization. Questions about the protocol were also not tested for reliability or validity and were designed to discover protocol understanding and use and to obtain feedback from staff about the protocol.

### **Future Works and Recommendations**

Like any project, maintaining momentum and sustainability is vital to project success. To ensure that early mobilization efforts continue in the NSICU at UNC Health Care, several recommendations can be made to ensure mobilization continues in the NSICU and expands beyond the NSICU. Ongoing early mobilization education will need to be developed for the NSICU, especially when training new staff members. Yearly staff training will be necessary

on the mobilization equipment to ensure safe mobilization. Although the protocol was placed outside each patient room within the nursing folder, at the nurse's station, and mobilization steps were posted on unit computers, staff still requested the protocol be in clear view. Larger versions of the protocol may need to be created and posted on the unit or within patient rooms that staff can write on with dry erase markers to indicate which step the patient is currently on. Not only could this be used as a communication tool for staff, but this could also be used as a reminder to family what step the patient is currently on and motivate patients to mobilize.

Creating a team of providers and champions from each specialty, focused on maintaining momentum in order to continue mobilization efforts, would ensure that mobilization becomes a part of the NSICU culture and a daily part of patient care. Although great strides were made during protocol implementation to change the culture in the NSICU and improve teamwork, to sustain momentum and continue success, leaders from each specialty will need to be identified to continue protocol success. Staff have already identified that they feel strongly supported by management in their efforts to mobilize patients in the NSICU. However, it will take more than managerial and provider support alone to sustain mobilization efforts.

This NSICU could greatly benefit from the addition of a full time PT or OT assigned to the NSICU to assist with managing early mobilization efforts. It is strongly supported in the literature that early mobilization is a cost effective intervention to reduce patient's risk of infection, long term weakness and hospital LOS (Bassett et al., 2012; Clark et al., 2013; Engel, Tatebe, et al., 2013; Morris et al., 2008; Needham et al., 2010; Schweickert et al., 2009). By hiring a full time PT or OT in the NSICU responsible for assisting with

mobilization efforts, hopefully it can be proven that the addition of a full time PT or OT further increases mobilization efforts, can provide the needed education staff request, and can further drive mobilization efforts in the NSICU.

At the initiation of this project, sister units, 6 Neuroscience and ISCU, were notified of the project, as the intent was that mobilization efforts would continue after patients transitioned out of the NSICU. However, the educational focus of these units was beyond the scope of this project. Yet, NSICU nurses were educated to communicate to the 6 Neuroscience and ISCU nurses which mobility step patients had achieved during their NSICU stay and send the Neuro Early Mobilization Protocol with the patient upon transfer out of the NSICU. Working with these units, including staff and managers, to obtain feedback about protocol, including use and understanding would be recommended. Of great interest would be to see if the protocol was continued after patients were transferred out of the NSICU and if patients continued to progress from the step they had achieved while in the NSICU or digressed following transfer, a phenomena that was discussed prior to protocol implementation.

Additionally, the protocol would need to be evaluated further for overall use, patient benefit, and safety. Due to the nature of this project, it did not allow for further protocol evaluation. To evaluate protocol use, the EMR would ideally need to be updated to incorporate the Neuro Early Mobilization Protocol. Not only would incorporation of the protocol into the EMR allow for better documentation, it would hopefully improve HCP use. Frequency of protocol use would be determined through both provider and HCP documentation. Patients could also be evaluated for how they progressed through the Neuro Early Mobilization Protocol based on their diagnosis. This information could also be

expanded beyond the NSICU to evaluate how patients progressed during their entire hospitalization, should the protocol successfully be implemented throughout units that care for neuro patients.

Safety will also need to be further assessed from both a patient and HCP point of view. Further assessment of adverse events will need to be monitored over a longer period of time. Not only will patient safety need to be monitored during mobilization, but staff safety will also need to be monitored as well. Ensuring clear communication, appropriate documentation, and adequate training on safe patient handling of patients in the NSICU is necessary when mobilizing this patient population.

To evaluate the overall patient benefit from early mobilization, patient outcomes could also be evaluated. Specifically, ventilator days, infection rates (VAP, catheter associated urinary tract infection and central line infection), reduction in the use of restraints, the number of falls, and pressure ulcers, along with the total number of ICU and hospital LOS should be assessed. Additionally, patient status at discharge would be of great interest. In order to see a true benefit to the use of early mobilization, a cost analysis would need to be completed to evaluate the cost savings as a result of implementing the Neuro Early Mobilization Protocol should it be found that by implementing the protocol that this patient population experiences similar benefits as patients in other ICUs.

Ideally, to see true patient benefit and to evaluate patient outcomes and cost savings, randomization would need to occur. Finding similar institutions who have not embarked on mobilization efforts and randomizing them to either a control group or a mobilization group and testing patient outcomes using the Neuro Early Mobilization Protocol would ideally

provide the greatest setting to test the reliability and validity of the Neuro Early Mobilization Protocol.

## **Conclusion**

Early mobilization is a safe and feasible intervention that has been proven to improve patient outcomes, reduce ventilator days, limit the number of ICU and hospital days, and reduce costs (Engel, Tatebe, et al., 2013; Morris et al., 2008; Needham & Korupolu, 2010; Schweickert et al., 2009). Although highly supported in the MICU, there is little evidence and few protocols designed to support early mobilization in the NSICU (Klein et al., 2014; Mulkey et al., 2014; Titsworth et al., 2012). Yet, patients in the NSICU can still potentially benefit from early mobilization. The purpose of this DNP project was to refine, implement and evaluate a Neuro Early Mobilization Protocol with a multidisciplinary team working together to increase mobilization efforts in the NSICU. As a result of this project, HCP were able to identify benefits of early mobilization. There were challenges that the HCP encountered when implementing the protocol, primarily focusing on issues with communication and teamwork. A mobilization station was created for staff members in order to have a central location with all mobilization supplies. There were no adverse events documented during the implementation of the Neuro Early Mobilization Protocol. In general, the healthcare team found the protocol easy to use with the neuro population and there was a change in beliefs following the implementation of the Neuro Early Mobilization protocol that staff had more time and help. Additionally, staff saw more benefit to mobilizing comatose patients using the protocol.

For the future, this protocol will require further study to evaluate its overall safety and use. Patient outcomes will need to be assessed along with the completion of a cost analysis to evaluate the cost savings incurred as a result of mobilization efforts. Finally, multi-center testing will be required to further validate the protocol for future use in other NSICUs.

## APPENDIX A: KEY TRAINING POINTS FOR NURSES

### Neuro Early Mobilization Protocol

**While reviewing the protocol, please remember to discuss the following changes:**

- Prior to mobilizing any patient, please read the **exclusion criteria**.
  - If the patient meets any of the criteria, proceed only to Step 1, and assess tolerance.
- Patients do not have to advance through the mobilization steps in order, steps can be bypassed or reverted back based on tolerance.
- Be sure to assess tolerance DURING and AFTER each mobilization step, or as indicated.
- Passive Range of Motion (PROM) was added (2x/day).
  - Please encourage family members to assist when able.
- Goals are listed next to each step to guide mobilization, they are not mandatory, however are encouraged to increase patient mobilization.
- Be sure there is an active PT/OT order if the patient is tolerating Step 4 or higher, or if you feel the patient would benefit from PT/OT services.
- If mobilizing a patient on a ventilator, please notify PT/OT and respiratory therapy to assist with mobilization.
  - Obtain an order from provider to “mobilize on portable vent” or “mobilize with ambu bag”
- Where to document mobility “Steps” in EPIC:
  - Flowsheets→Daily Cares/Safety→Activity→
    - Mobility→Activity→Other (Comments)→Free Text **Step #** \_\_\_\_

- If an adverse event occurs, please complete a PORS incident report. Reportable events are listed on the protocol.
- Mobility to be discussed daily on rounds.
- Please discuss the patient's current mobilization step with the receiving nurse during report.
- Send the Neuro Early Mobilization Protocol with the patient upon transfer out of the NSICU.



## APPENDIX B: NEURO MOBILITY PROTOCOL STEPS

### **Neuro Early Mobilization Protocol**

**Step 1: Range of Motion**

**Step 2: Head of Bed > 45°**

**Step 3: Bed in Chair Position**

**Step 4: Cardiac Chair**

*Verify active PT/OT orders*

**Step 5: Sit on Edge of Bed**

**Step 6: Stand at Edge of Bed**

**Step 7: Ambulate/Pivot from Bed to Chair**

**Step 8: Ambulate as Tolerated**

(Note: Steps are in color to match protocol design)

## APPENDIX C: BENEFITS OF EARLY MOBILIZATION

### **Benefits of Early Mobilization**

- Improves patient functional outcomes (both short-term and long-term)
- Reduces the number of ventilator days
- Reduces delirium
- Reduces hospital-acquired infections
  - Ventilator Associated Pneumonia
  - Catheter Associated Urinary Tract Infections
  - Central line infections
- Increases the patients likelihood of being discharged to home from the hospital
- Decreases ICU and hospital length of stay
- Reduces costs

## APPENDIX D: PRE-IMPLEMENTATION SURVEY

### Early Mobilization in the NSICU

Pre-Implementation Survey 2015

**Please answer the following questions regarding mobilization in the NSICU.**

---

1. Please indicate which discipline you represent:

Nursing: \_\_\_\_\_ Physical Therapy: \_\_\_\_\_ Respiratory Therapy: \_\_\_\_\_  
CST: \_\_\_\_\_ Occupational Therapy: \_\_\_\_\_

---

2. How motivated are you to mobilize your patients?

Not Motivated      Somewhat Motivated      Highly Motivated

---

**For Questions 3-8, how much do you agree or disagree with each statement?**

3. I may get injured mobilizing my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

4. I do not have enough time on my shift to mobilize my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

5. I am afraid my patients will fall if I mobilize them.

Strongly Disagree      Disagree      Agree      Strongly Agree

6. I do not have enough help to mobilize my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

7. It is not a priority to mobilize my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

8. My patient is comatose and will not benefit from early mobilization.

Strongly Disagree      Disagree      Agree      Strongly Agree

9. Do you feel you have the tools you need to safely mobilize your patients? YES NO

10. If no, what sort of additional tools do you feel you need? \_\_\_\_\_

11. On average, how much time do you currently spend on a daily basis **actively** mobilizing your patients? (For Nurses: Not including every two hour turns and/or frequent linen changes).

- a. 15-30 minutes    b. 31-45 minutes    c. 46-60 minutes    d. 61-75 minutes  
e. 76-90 minutes    f. 91- 120 minutes    g. 121 – 150 minutes    h. Greater than 2.5 hours

12. Please list as many patient benefits as you can for the use of early mobilization in the NSICU.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Researchers sometimes need to collect information repeatedly from the same participants over a period of time in such a way as to satisfy two requirements:

1. Each batch of information needs to be connected with the particular person who furnished it.
2. The information needs to be collected anonymously to protect the privacy of the participant.

One way to do this is to have each participant generate his/her own personal Identification Code to protect his/her anonymity. This is what the following optional questions will be used for.

13. Please *circle* the letter below that represents the **First Letter** of your **MOTHER'S FIRST NAME: (If unknown, select Z)**

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

14. Please *circle* the letter below that represents the **First Letter** of your **FATHER'S FIRST NAME: (If unknown, select Z)**

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

15. **How many *Older Brothers* do you have?**

(Both alive and deceased, step or otherwise. If you have greater than 9 older brothers, select 9.)

0      1      2      3      4      5      6      7      8      9

16. **How many *Older Sisters* do you have?**

(Both alive and deceased, step or otherwise. If you have greater than 9 older sisters, select 9.)

0      1      2      3      4      5      6      7      8      9

17. **Please *circle* the month in which you were born.**

January - 01

May - 05

September - 09

February - 02

June - 06

October - 10

March - 03

July - 07

November - 11

April - 04

August - 08

December - 12

18. Please *circle* the letter below that represents the ***First Letter*** of **Your Middle Name**.

(If you have no middle initial, select the letter N)

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

Questions 13-18 were adapted from Damrosch, S. P. (1986). Ensuring anonymity by use of subject-generated identification codes. *Research in Nursing & Health*, 9, 61 – 63.

APPENDIX E: POST-IMPLEMENTATION SURVEY

**Neuro Early Mobilization Protocol Evaluation**

Post-Implementation Survey 2015

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**Please answer the following questions regarding mobilization in the NSICU.**

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1. Please indicate which discipline you represent:

Nursing: \_\_\_\_\_ Physical Therapy: \_\_\_\_\_ Respiratory Therapy: \_\_\_\_\_  
CST: \_\_\_\_\_ Occupational Therapy: \_\_\_\_\_

---

2. How motivated are you to mobilize your patients?

Not Motivated      Somewhat Motivated      Highly Motivated

---

**For Questions 3-8, how much do you agree or disagree with each statement?**

3. I may get injured mobilizing my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

4. I do not have enough time on my shift to mobilize my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

5. I am afraid my patients will fall if I mobilize them.

Strongly Disagree      Disagree      Agree      Strongly Agree

6. I do not have enough help to mobilize my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

7. It is not a priority to mobilize my patients.

Strongly Disagree      Disagree      Agree      Strongly Agree

8. My patient is comatose and will not benefit from early mobilization.

Strongly Disagree      Disagree      Agree      Strongly Agree

9. Do you feel you have the tools you need to safely mobilize your patients? YES NO

10. If no, what sort of additional tools do you feel you need? \_\_\_\_\_

---

11. On average, how much time do you currently spend on a daily basis **actively** mobilizing your patients? (For Nurses: Not including every two hour turns and/or frequent linen changes).

- a. 15-30 minutes      b. 31-45 minutes      c. 46-60 minutes      d. 61-75 minutes  
e. 76-90 minutes      f. 91- 120 minutes      g. 121 – 150 minutes      h. Greater than 2.5 hours

**Questions 12 - 17 address the Neuro Early Mobilization Protocol, please indicate how much you agree or disagree with each statement.**

12. I understand the exclusion criteria of the Neuro Early Mobilization Protocol.

Strongly Disagree      Disagree      Agree      Strongly Agree      NA

13. I understand the mobility steps of the Neuro Early Mobilization Protocol.

Strongly Disagree      Disagree      Agree      Strongly Agree      NA

14. I understand how to assess tolerance during and after mobilizing my patients using the Neuro Early Mobilization Protocol.

Strongly Disagree      Disagree      Agree      Strongly Agree      NA

15. I am confident in using the Neuro Early Mobilization Protocol to safely mobilize patients in the NSICU.

Strongly Disagree      Disagree      Agree      Strongly Agree      NA

16. I routinely use the Neuro Early Mobilization Protocol when mobilizing my patients in the NSICU.

Strongly Disagree      Disagree      Agree      Strongly Agree      NA



17. My manager(s) support my efforts in using the Neuro Early Mobilization Protocol.

Strongly Disagree	Disagree	Agree	Strongly Agree	NA
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18. How many years have you worked in the Neuroscience Intensive Care Unit (NSICU) at UNC Health Care?

- A. Less than 1 year
- B. 1-2 years
- C. 3-5 years
- D. 6-10 years
- E. 11-15 years
- F. Greater than 15 years

19. How many years have you been practicing in your current position (clinical support technician, nurse, physical therapist, occupational therapist, or respiratory therapist) whether at UNC Health Care or another institution?

- A. Less than 2 years
- B. 2-5 years
- C. 6-10 years
- D. 11-15 years
- E. 16-20 years
- F. 21-30 years
- G. 31-40 years

20. Which shift do you typically work in the NSICU? (Choose all that apply)

- A. Days
- B. Nights
- C. Weekends
- D. Rotating Days/Nights

21. Please list as many patient benefits as you can for the use of early mobilization in the NSICU.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

22. My biggest challenge when using the Neuro Early Mobilization Protocol was:

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23. What I like most about the Neuro Early Mobilization Protocol is:

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---

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24. For the future, how can the Neuro Early Mobilization Protocol be improved?

---

---

---

Researchers sometimes need to collect information repeatedly from the same participants over a period of time in such a way as to satisfy two requirements:

1. Each batch of information needs to be connected with the particular person who furnished it.
2. The information needs to be collected anonymously to protect the privacy of the participant.

One way to do this is to have each participant generate his/her own personal Identification Code to protect his/her anonymity. This is what the following optional questions will be used for.

25. Please *circle* the letter below that represents the **First Letter** of your **MOTHER'S**

**FIRST NAME: (If unknown, select Z)**

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

26. Please *circle* the letter below that represents the **First Letter** of your **FATHER'S FIRST**

**NAME: (If unknown, select Z)**

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

27. **How many *Older Brothers* do you have?**

(Both alive and deceased, step or otherwise. If you have greater than 9 older brothers, select 9.)

0      1      2      3      4      5      6      7      8      9

28. **How many *Older Sisters* do you have?**

(Both alive and deceased, step or otherwise. If you have greater than 9 older sisters, select 9.)

0      1      2      3      4      5      6      7      8      9

29. **Please *circle* the month in which you were born.**

January - 01

May - 05

September - 09

February - 02

June - 06

October - 10

March - 03

July - 07

November - 11

April - 04

August - 08

December - 12

30. Please *circle* the letter below that represents the ***First Letter*** of **Your Middle Name**.

(If you have no middle initial, select the letter N)

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

Questions 25-30 were adapted from Damrosch, S. P. (1986). Ensuring anonymity by use of subject-generated identification codes. *Research in Nursing & Health*, 9, 61 – 63.

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