Summer 2023

Implementation of a Nurse-Driven Early Mobility Protocol in Critical Care to Reduce Intensive Care Unit Acquired Weakness (ICUAW)

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DNP Manuscript Defense Approval

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Date: * 07/17/2023

Choose your DNP program: *
- ○ Adult-Gerontology Acute Care Nurse Practitioner (Doctor of Nursing Practice)
- ○ Family Nurse Practitioner (Doctor of Nursing Practice)
- ◉ Post-Master's DNP (Doctor of Nursing Practice)

Manuscript Title: * Implementation of a Nurse-l

Date of Manuscript Approval: * 07/21/2023

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Implementation of a Nurse-Driven Early Mobility Protocol in Critical Care to Reduce Intensive Care Unit Acquired Weakness (ICUAW)

A DNP Project Submitted to the
Graduate Faculty
Of Jacksonville State University
In Partial Fulfillment of the
Requirements for the Degree of
Doctor of Nursing Practice

By

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Jacksonville, Alabama

August 4, 2023

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Abstract

Background: Intensive care unit acquired muscle weakness (ICUAW) is a syndrome of general weakness that occurs while a patient has a critical illness. Almost half of all ICU patients develop ICUAW. The most common occurrence of ICUAW is seen in patients diagnosed with prolonged mechanical ventilation, severe sepsis, or difficulty weaning from mechanical ventilation (MV). Bedrest is the number one risk factor for the development of ICUAW and the elderly are at higher risk. The best treatment for ICUAW is early mobility which has shown positive effects for decreasing ventilator days and intensive care unit (ICU) length of stay (LOS).

Purpose: The purpose of this quality improvement project is to decrease ventilator days and decrease ICU LOS through the implementation of a nurse-driven early mobility protocol in critical care.

Methods: The Medical Research Council (MRC) sum score was used to compare the muscle strength of ICU patients on admission to and discharge from the ICU. Patient outcomes measured will include ICU length of stay and number of ventilator days.

Results: Results of a two-sample t-test to measure ICU LOS and ventilator days in two ICUs showed there was no statistical significance.

Conclusion: Early mobility remains the safe and effective standard of care in critical care. The results of the quality improvement project tell us that a robust multidisciplinary plan of implementation is needed. Barriers must be mitigated to deliver the best results.

***Keywords*:** Early mobility, intensive care unit acquired muscle weakness (ICUAW), MRC sum score, Liberation Bundle

Acknowledgments

I would like to acknowledge those who have helped me accomplish my goals and supported me along the way.

My preceptor Bethany Anders, my chair Dr. Cheryl Emich, and all the instructors in the JSU DNP Program that have helped and encouraged me.

Thank you to Jessica Pitcock and Emily Emaneulsen for supporting this project.

Thank you, Dr. Serena Gramling, for being my teaching partner, entertaining my endless questions, and seeing that I had time to work on this project.

I owe so much to my parents Martha and Jerry Owens, without their support and help I would never have been able to even attempt to earn my DNP.

My kids, Owen and Abigail Key never forget that everything I do is because of you and for you.

Lastly, I thank and give praise to God who guides my steps, always loves me, and never leaves me.

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Implementation of a Nurse-Driven Early Mobility Protocol in Critical Care to Reduce Intensive Care Unit Acquired Weakness (ICUAW)

Intensive care unit-acquired muscle weakness (ICUAW) is prevalent in a majority of intensive care unit (ICU) patients. The only identified reason for ICUAW is the critical illness itself (Gama Lordello, et al., 2020). The major risk factor is immobility or bed rest, which is often the case in the ICU setting for a patient battling a critical illness (Vanhorebeek et al., 2020). Patients with a critical illness show a decrease in muscle mass within as short as 72 hours after mechanical ventilation (MV) and by discharge may experience as much as an 18% weight loss (Marra et al., 2017). The rate of decrease in skeletal muscle strength. in which a critically ill patient on bedrest is 1%-1.5% each day (Cooper et al., 2021). ICUAW may increase the length of time spent on MV, increase time to out-of- bed mobility, increase the risk of delirium, and length of ICU stays, and many patients still suffer declined mobility post-hospital discharge (Linke et al., 2020). Being placed on bed rest for an extended time will also cause increased cardiac workload and patients who remain supine develop more intolerance to movement causing orthostatic changes (Cooper et al., 2021). Patients experience a decline in functional independence and increased mortality rates thus beginning interventions to decrease muscle wasting benefits survivors of critical illness (Nickels et al., 2020). To counteract the effects of ICUAW, nurses can implement an early mobility protocol. Early mobility in critical care patients has been shown to decrease the length of time on MV (McCarty et al., 2022), increase levels of activity, decrease time to out- of-bed activities, and decrease days of delirium (Marra, et al., 2017). A nurse-driven early mobility protocol gives power to the bedside nurse to provide mobility interventions to benefit the health of the patient during a critical illness.

Background

Researchers have recognized that a stay in the ICU leads to many short and long-term effects and a need to reverse and prevent those effects. There are over four million ICU admissions each year and the long-term consequences can affect both physical and mental abilities (Marra et al., 2017). One of the consequences of interest is ICUAW. ICUAW is a syndrome of general weakness that occurs when a patient has a critical illness (Hodgson & Tipping, 2017). According to research, the median prevalence of ICUAW is as high as 43% (Vanhorebeek et al., 2021). ICUAW is a diagnosis of exclusion, clinical indicators are normal cognition, cranial nerves intact, and symmetrical weakness. The Medical Research Council (MRC) sum score is considered the standard tool used to aid in the diagnosis of ICUAW (Cook et al., 2022). The critical illness itself is the only explanation for the development of muscle weakness in the critically ill. These findings may be more difficult to elicit in patients receiving sedation or neuromuscular blocking agents (NMBA), patients experiencing delirium, and patients who received MV for more than 48 hours (Hodgson & Tipping, 2017).

Several risk factors put patients at a high-risk for ICUAW. The number one risk factor for ICUAW is bed rest, which is often the case during a critical illness (Devlin et al., 2018). Risk factors for developing ICUAW include the severity of illness, multiple organ failure, sepsis, longer time receiving mechanical duration, degree of hyperglycemia due to stress response, dose, and duration of vasopressors, receiving parenteral nutrition, and sedative use (Vanhorebeek et al., 2020). Other risk factors discussed are the use of glucocorticoids and neuromuscular blocking agents (NMBAs) (Wang et al., 2020b). Age is also a risk factor. Prevalence in elderly ICU patients is as high as 70% (Wang et al., 2020b). The most common occurrence of ICUAW is seen in patients diagnosed with prolonged MV, severe sepsis, or difficulty weaning from MV.

According to Liu et al. (2020), a difference in incidence rates can be seen among different types of patients: conscious patients receiving MV is 26-65%, the rate increases to 67% when receiving MV for greater than 10 days, 70% in the presence of sepsis, and 100% in patients with multi-organ failure (Liu et al., 2020). Covid-19-related critical illnesses must be included in describing the incidence of ICUAW. Many research articles were published pre-COVID-19. According to Medrinal et al. (2021), a large majority of COVID-19 ICU patients developed ICUAW, and as many as 44% of those patients continued to have symptoms of ICUAW after admission despite mobilization. The higher incidence of ICUAW in COVID-19 is attributed to longer mechanical ventilation times (Medrinal et al., 2021).

Early mobilization is the most effective way to prevent and treat ICUAW. Early mobility is considered safe and effective and consists of exercises that begin in bed and progress to out-of-bed activities with an end goal of ambulation (Krupp, 2018). The adoption of early mobility protocols is a slow process reflecting a need for implementation to catch up with the research and recommendations (Raurell-Torreda` et al., 2021). The rate of implementation of early mobility protocols in critical care from an international survey is only 24-30%, despite being part of the recommendations with the ABCDEF Bundle. Multiple benefits are noted with the implementation of early mobility protocols in critical care. Benefits discussed include a decrease in the incidence and severity of ICUAW (Anekwe et al., 2020a), decreased diaphragm dysfunction in prolonged MV (Dong et al., 2021), decreased delirium days, more days of unassisted breathing, and improved chances of returning to independent functional status (Marra et al., 2017). According to Marra et al. (2017), patients who underwent both early mobility and spontaneous awakening trials daily had improved outcomes such as a decrease in MV days. The sooner early mobility begins in ICU admission the greater opportunity for quicker recovery and

prevention of ICUAW (<3 days), after approximately four days of MV, there does not appear to be an improvement in long-term outcomes such as post-discharge rehabilitation (Marra et al, 2017).

Needs Analysis

Short-term consequences of ICUAW are those seen during ICU stay. Short-term consequences are increased mortality and LOS, and ventilator days are longer (Vanhorebeek et al., 2020). The weakness patients experience can lead to significant impairments in physical activity and can have long-term effects lasting months to years after discharge from the hospital (Anekwe et al., 2020a). ICU patients can present with a marked loss of muscle mass within the first week of ICU stay which can be greater than 10% and as high as 25%. An increased risk of extubation failure and swallowing disorder can be noted, as well (Vanhorebeek et al., 2020). Also noted are higher risk and incidence of ICU and in-hospital death (Garcia-Perez de Sevella & Sanchez-Pinto, 2023). Other negative outcomes may include ventilator-acquired pneumonia, pressure injuries, and thromboembolic disease (Cooper et al., 2021). Hospital costs also increased (Vanhorebeek et al., 2020).

Long-term complications include post- ICU mortality, increased rehabilitation LOS, and a decrease in discharges to home (Vanhorebeek et al, 2020). Post- intensive care syndrome (PICS) is the term used for the survivors of critical illness who continue to have complications after discharge and includes the cognitive, physical, and psychological issues that remain (Colbenson et al., 2019). Due to decreases in functional ability, patients with persistent ICUAW post-discharge from the hospital experienced a lower quality of life (Garcia-Perez de Sevella & Sanchez-Pinto, 2023). Patients with ICUAW had a higher one-year mortality rate than those who were not weak. When ICUAW persisted until ICU discharge the one-year mortality was more

elevated. The more severe the ICUAW, the higher the mortality rate post-discharge (Vanhorebeek et al., 2020).

One study revealed that there was a significant difference in ICU and ventilator days of those with ICUAW compared to those who did not develop ICUAW. The mean number of days in ICU for patients with ICUAW was 10.93 $\pm$ 6.56 days compared to 5.03 $\pm$ 3.58 days for those who did not have ICUAW. Ventilator days for ICUAW patients were 9.27 $\pm$ 5.28 days compared to patients without ICUAW at 3.87 $\pm$ 3.65 days. Both results were statistically significant (Baby et al., 2021).

Early mobilization of critical care patients is a known protective factor in the reduction of ICUAW. When early mobilization therapy is initiated within 2 to 5 days of the onset of illness, the complications of bed rest or immobility can be prevented. Other benefits are decreased delirium and an improvement in functional status at discharge from ICU (Raurell-Torreda`, 2021).

The location for the DNP project is a community hospital in northeast Alabama with 346 beds. The hospital includes two ICUs, a 16-bed medical intensive care unit (MICU) and a 16-bed surgical intensive care unit (SICU). Critical care is where the DNP project will be implemented. Stakeholders for the project include the student preceptor, the ICU unit directors, the clinical educator, and the physical therapist. According to the unit directors of MICU and SICU the average LOS for MICU and SICU is five and nine days, respectively. Ventilator days for all critical care range from 4.2- 6.7 days. The ventilator days include open heart patients, further information will need to be obtained to exclude data from patients in the heart program due to those patients already having a mobilization protocol. A pre-implementation chart audit was completed to obtain ICU LOS and ventilator days. According to the audit, MICU and SICU

average LOS is 5.45 days and 5.60 respectively. MICU and SICU average ventilator days were 8.7 days and 12.5 days respectively. According to the director of physical therapy, it is estimated that 100% of the patients seen by physical therapy in the ICU have some degree of ICUAW.

The ABCDEF Bundle developed by the Society of Critical Care Medicine (SCCM) includes the element of early mobility and is recommended for implementation for all critical care patients (Devlin et al., 2018). A SWOT Analysis was completed (see Appendix A). Implementation and documentation of the complete ABCDEF Bundle among the units are low. Addressing early mobility specifically, documentation and implementation are very low as well. In current practice for early mobility, nursing staff turn and position patients every two hours and consult physical therapy (PT) for range of motion and activity. There is no standardized protocol for the delivery of early mobility, nor is there a standard tool used for assessment. The interventions completed can vary by nurse and physician.

Problem Statement

ICUAW is a problem that can be improved through a nurse-driven early mobility protocol for critical care patients (see Appendix B). Early mobility improves patient outcomes by following the ABCDEF bundle. The early mobility protocol gives power to the nurse to implement interventions to improve patient outcomes such as decreased time to out-of-bed activity, decreased ventilator times, and decreased ICU LOS. The PICOT question that guided this project was: Does a nurse-driven early mobility protocol decrease intensive care unit acquired muscle weakness (ICUAW) in patients 19 and older with ICUAW compared to patients 19 and older with ICUAW who receive the current care over 2 months? Current practice is nursing staff turn and position patients every two hours and consult physical therapy (PT) for a range of motion and activity. Other activities were at the discretion of the physician and nurse.

The objective of the DNP project is the implementation of nurse-driven early mobility in critical care patients for prevention and decreasing ICUAW. The purpose of the project was to improve patient outcomes by decreasing the time for out-of-bed activities, ventilator days, and ICU LOS by a minimum of one day for each outcome. Implementation took place over a two-month timeframe. The overarching aims of this project are the implementation of a nurse-driven protocol for early mobility, evidence of a decrease in MV days, and decreased ICU LOS

Review of Literature

Multiple databases were searched including CINAHL, PubMed, Ovid, Cochrane, and Google Scholar. Studies included covered several topics addressing ICUAW and early mobility. Keywords used in the search were “intensive care unit-acquired muscle weakness or ICUAW”, “early mobility or mobilization”, “critical care or intensive care unit or ICU”, “practice guidelines”, MRC sum score”, ‘alternative early mobility activities”, “barriers to early mobility”, and “Liberation Bundle or ABCDEF Bundle”. All articles reviewed were from the past five years.

Early Mobility Intervention and Implementation

According to the literature, the best intervention for ICUAW is early mobility (Anekwe et al., 2020a; Dong et al., 2021; Krupp et al., 2018; Winkelman et al., 2018). Early mobility is therapy typically completed by physical therapy or nursing staff that consists of exercises that begin in bed and progress to ambulation (Krupp et al., 2018). Multiple authors have found that the implementation of early mobility is safe and feasible for the prevention and improvement of ICUAW and increased health of ICU survivors (Dong et al., 2021; Krupp et al., 2018; McWilliams et al, 2017;). Implementation of early mobility programs shows encouraging results such as improvements in physical function and an increase in patient mobility levels (Krupp et

al., 2018; McWilliams et al., 2018). Several outcomes have shown improvement when early mobilization is implemented in the ICU. Outcome improvements include a decrease in ventilator days, a decrease in days of delirium, decreased ICU LOS, and increased mobility levels (Dong, et al., 2021; McWilliams et al., 2017; Winkelman et al., 2018). Despite the positive data found in the literature 45% of ICUs in the United States have implemented early mobility programs (Krupp et al., 2018).

Implementation of an early mobility protocol should be a team-based, multi-disciplinary, collaborative experience (Linke et al., 2020; Winkelman et al., 2020). Early mobility consists of several steps: completing a safety screening and bedside mobility scale, choosing the appropriate mobility level, and performing the mobility exercises (Devlin et al., 2018). Mobility activities may begin with passive range of motion for patients with extreme weakness or sedated. Passive range of motion has shown a small benefit in the prevention of ICUAW when initiated soon after ICU admission (Vollenwider et al., 2022). As patients gain strength, mobility exercises progress from a passive range of motion to more active and sitting in the chair position and eventually sitting on the edge of the bed and sitting in a chair. The benefits of patients spending time out of bed improve the patient's lung aeration and gas exchange (Hickman et al., 2021). The end goal of early mobility is ambulation.

Alternative Interventions

Cycle Ergometer Training

Cycle ergometer training is a potential alternative to traditional early mobility protocol, and it can be used alone or in conjunction with neuromuscular electrical stimulation (NMES) to aid in the prevention or slowing of the development of ICUAW (Veldema, et al., 2019; Waldauf et al., 2019). The use of cycle ergometer training with increasing pedal resistance has shown

promise in increasing motor activity in patients with ICUAW (Veldema et al., 2019). While the addition of cycle ergometer training does help provide mobility activities, some studies did not reflect an improvement in muscle atrophy or increase independent activity progression better than the usual care received (Gama Lordello et el., 2020; Nickels et al., 2020). Silva et al, (2020), suggested passive bed exercise with a cycle ergometer can be done on heavily sedated and ventilated patients .to help improve muscle fiber function and reduce muscle atrophy.

Neuromuscular Electrical Stimulation (NMES)

NMES is the application of small electrical impulses to the skeletal muscles to create muscle contraction. The use of NMES may be useful in patients who are unable to participate in active mobility (Garcia- Perez de Sevilla & Sanchez-Pinto, 2023). Using NMES as an early intervention in the critically ill and patients receiving MV reveals that NMES may decrease ventilator time and increase muscle strength in the lower extremities (Garcia- Perez de Sevilla & Sanchez-Pinto, 2023; Gutie'rrez-Arias, 2021). Liu et al. (2020), confirmed the benefits of NMES as improved muscle strength, decreased time of MV, improvement in walking distances, and more patient involvement in ADLs.

Neuromuscular Stimulation Combined with Other Interventions.

NMES can be combined with other interventions such as cycle ergometer or early mobility exercises (Valdez dos Santos et al., 2020; Waldauf et al., 2019). The simultaneous use of NMES in combination with passive supine cycling with a cycle ergometer has shown positive results in the prevention of the loss of muscle mass (Waldauf et al., 2019). According to Garcia-Perez de Sevilla & Sanchez-Pinto (2023), the combination of physical exercise with NMES aid in the prevention of muscle mass loss and increase the recovery process in critically ill patients. Patients with ICUAW show improved muscle strength and function with combined therapies

over the usual care alone (Garcia-Perez de Sevilla & Sanchez-Pinto, 2023; Valdez dos Santos et al., 2020). Benefits of combined therapies include shorter time of MV, insulin sensitivity, improved muscle mass, and decreased length of ICU stay.

Dose of Mobilization

An area that still needs more investigation is the dose of mobility that is most effective in critically ill patients. At the current time, there are no standards for the form, dose, or duration of early mobility (Clarissa et al., 2019). Research suggests that early mobility needs to be tailored to the different types of patients that are found in the ICU (Fuest et al., 2023), the number of times per day and intensity of mobility activities (Winkelman et al., 2018), and when early mobility occurs in hospitalization (Santos de Queiroz et al., 2020) are all factors on the success of early mobility. Age, severity of illness, weight, age, current impairments, and comorbidities all impact how the patient will progress with early mobilization. Therefore, the approach to early mobility should be individualized according to pre-existing function, invasiveness of treatment, comorbidities, and frailty (Fuest et al., 2023).

Medical Research Council (MRC) Sum Score

The MRC sum is considered by many to be the standard tool used for the assessment of ICUAW (Cook et al., 2022; Fontela et al., 2021). The MRC sum score has been shown to identify significant weaknesses in critically ill patients and has been determined to be reliable and valid (Fontela et al., 2021; Turan, Z. et al., 2020). The tool assesses the muscle strength of three muscle groups in the upper and lower extremities using a 0-5 scale, with a total score ranging from 0-60 to determine ICUAW at a score of less than 48 (Cook et al., 2022; Fontela, 2021; MRC, 1943). The MRC sum score aids in the prediction of failed spontaneous breathing trials (SBT) and prolonged weaning of those receiving MV (Chen et al., 2019).

Barriers and Facilitators to Implementation

Understanding what barriers nurses and patients perceive when implementing early mobility is important to success (Liew et al., 2021). Barriers should be anticipated with the implementation of a new protocol. It is important to identify and mitigate barriers to the project (Anekwe, 2020b)

Patient and Staff Safety

Patient and staff safety are both important aspects to investigate. Managing safety risks will need to be a top priority, avoiding adverse events that may occur. Potential safety concerns may include falls, removal of the endotracheal tube or IV access, hemodynamic changes, and desaturation (Nydahl et al., 2017). Often, misconceptions about safety lead to lower rates of consistency in the implementation of early mobility (Linke et al., 2020). Nursing staff identified several perceived barriers to the implementation of early mobility related to patient safety. Lack of sufficient equipment may become an issue, such as cardiac chairs for patients to sit in, walkers and rollators, resistance bands, and balls for strengthening. Hemodynamic instability, patient falls, accidental extubation, and use of vasopressors are of concern to nursing staff (Bilodeau, et al., 2018; Liew et al., 2021). Another barrier will be overcoming the education gap to assure the nursing staff is confident in each step of the early mobility process. To mitigate safety issues, adequate education and training are needed. Yearly training, especially for new employees, may be needed to ensure proper technique and reassurance in the level of competency. Also, using a multidisciplinary approach will improve outcomes and increase teamwork for the benefit of the patient (Liew et al., 2021).

Workload, Time Constraints, and Staffing Problems

Perceptions from nursing staff identify additional workload, time constraints, and working short-staffed as barriers to the early mobilization of patients (Liew et al., 2021). Nurses expressed concern over the amount of time that would need to be dedicated to delivering early mobility (Liew et al., 2021). Often the addition of a protocol is perceived as adding to the workload of the nurse rather than interventions that will be beneficial (Liew et al., 2021). Another barrier is how often the unit is working short-staffed. Frequently, units working short-staffed feel as if there is not enough time to perform all the duties of the day plus adding a new protocol (Liew et al., 2021). All these perceived barriers have brought out the need for early mobility to be a multidisciplinary approach (Liew et al., 2021).

ICUAW can be slowed or prevented using an early mobility protocol (Anekwe et al., 2020a; Dong et al., 2021; Krupp et al., 2018; Winkelman et al., 2018). Early mobility improves patient outcomes and decreases costs (Dong et al., 2021; McWilliams et al., 2017; Winkelman et al., 2018). A standardized early mobility protocol will help guide nursing staff in providing consistent mobility exercises. Barriers will continue to exist and will need to be addressed to encourage the implementation of early mobility.

Theoretical Model

Kurt Lewin's Three Step Model of Planned Change is used in organizations preparing to make a change and will guide the DNP project. The goal of this theory is to reach a higher level of performance. Maintaining a higher level of performance is difficult and often short-lived. Lewin's theory states "successful change includes three steps: unfreezing the current level, moving to the new level, and freezing on the new level" (Lewin, 1997, p.330). The critical care units at the selected agency are preparing for the implementation of an early mobility protocol

for critical care patients. To achieve improved patient outcomes, a move to a higher level of care is needed.

Lewin's theory will be used as a guide to fill the current gap in practice at the agency. Currently, there is no standardized early mobility protocol being used at the agency. Physical therapy is the primary mode of mobility, other activities are performed at the discretion of the physician and nursing staff. Lewin's theory has been used in many facilities to promote change. Stahley et al. (2020), used Lewin's theory to introduce change to improve bed traffic control and flow in the emergency department (ED), which led to improvement in door-to-provider time, door-to-discharge times, decreased patients leaving without being seen and patient satisfaction increased. Unfreezing the current level is the first step and will involve destabilizing current beliefs and knowledge with information about the problem of ICUAW and the impact it has on patients (Lewin, 1997). Often this stage is the most difficult because change can be hard and there may be uncertainty among the staff (Burnes, 2020). The physical therapy and nursing staff will receive education about early mobility and the early mobility protocol. Instruction for documentation in the electronic health record (EHR) will be provided. Education is necessary to follow the model of changing prior learning must change and be replaced with new education. Lewin felt that unfreezing allowed for the fluidity that is needed for change to occur (Burnes, 2020).

During the second step, the implementation of the new early mobility protocol will take place. Uncertainty will likely continue to be present during implementation, but the staff will begin to see the benefits of early mobility to the patients (Burnes, 2020). As the transition is made, uncertainty should be met with rationale and research on the importance of the change. Abd el-shafy et al. (2019), combatted uncertainty by identifying champions to help reinforce the

change, providing education and rationales as needed, and continual tracking and reporting of adherence to the standards was done. Freezing on the new behavior is the last step in Lewin's Three-Step Model of Planned Change (Lewin, 1997). The purpose of the freezing stage is to stabilize and reinforce the new behavior to assure that regression does not occur. Freezing will occur once the staff embraces the changes and incorporated the new protocol into the daily delivery of care to patients (Burnes, 2020).

Lewin's Three-Step Model of Change is a well-known theory used for organizational change (Burnes, 2020). Simplicity has been seen as both a strength and a weakness of the theory. Another strength is the ease of application, especially in quality improvement (Burnes, 2020). Lewin's model also helps to focus the nurse leader on the change process (Harrison, et al., 2021). Weaknesses that have been noted are that the theory is linear and lacks a cognitive aspect (Burnes, 2020). Other weakness includes a disregard for conflict in an organization, the assumption of steady-state conditions, and use mostly on a small scale and a step-by-step change (Mangaliso et al.,2021)

Methodology

The Plan-Do-Study-Act (PDSA) methodology was used for the implementation of the DNP project. According to Moron (2020), the PDSA framework is made of four phases: Plan (planning the change wanted), Do (implementing the change plan), Study (analyzing the results after implementation), and Act (making changes based on the results). The PDSA model was adapted from Shewhart's plan-do-check-act design by Dr. Edwards Deming and uses a systematic process for the evaluation and continual improvement of a process (The W. Edwards Deming Institute, 2023).

Setting

The agency the DNP project will take place in is a 346-bed acute care community hospital in Northeast Alabama. The DNP project will be implemented in the critical care department of the hospital. The critical care department is made up of two 16- bed ICUs, the medical intensive care unit (MICU) and the surgical intensive care unit (SICU).

Population

The target population is the nurses, physical therapy staff, and nursing students who provide patient care in SICU and MICU. The patient population includes adults admitted to SICU or MICU. Common medical diagnoses of patients in ICU included but not limited to respiratory failure, pneumonia, COVID-19, heart failure, and acute respiratory distress syndrome (ARDS).

Inclusion/ Exclusion Criteria for the Population

Inclusion criteria included nurse or physical therapy staff working in critical care, and nursing students attending clinical in critical care. Exclusion criteria are nurses, nursing students, and physical therapy staff who do not work in critical care. Inclusion criteria for the patients were admission to critical care and an MRC sum score of 48 or less. Exclusion criteria for patients included any patient not admitted to critical care, received open heart surgery during admission, scored above a 48 on the MRC sum score, and if the patient expired during current admission to critical care.

Recruitment

Recruitment involved the creation of a flyer with project information and dates for education (see Appendix B). The recruitment flyer was posted throughout MICU and SICU in multiple places and discussed in the shift safety huddles daily. The director of physical therapy

announced upcoming education in the department and a flyer was posted. Nursing students' recruitment was announced during pre and post-conference on clinical days.

Consent

Participants received education regarding the DNP project. Participation in the project was voluntary. Consent was obtained before implementation from the nursing, physical therapy staff, and nursing students. A copy of the consent form was made available to each participant (see Appendix C).

Design

The quality improvement project focuses on the implementation of a nurse-driven early mobility protocol in critical care. Pre- and post-data collection from the electronic health record (EHR) was used to compare the data collected pre- and post-implementation of the protocol. The project is guided by theorist Lewin's Three-Step Plan of Change Model and the Plan-Do-Study-Act (PDSA) framework will be used for implementation.

Plan

The planning stage consists of all the tasks identified, and identifying the how, when, and where implementation will occur. Outcome predictions are also made in this phase (Christoff, 2018). The planning phase correlates with the unfreezing process of Lewin's Three-Step Model of Change. The unfreezing step is when the need for change is recognized and driving and restraining forces are identified. Education is a vital part of the unfreezing stage and is needed to help propel people toward the needed change (Burnes, 2020; Grass & Bundy, 2021). Institutional Review Board (IRB) approval (see Appendix D) was obtained, and CITI training was completed (see Appendix E). Consent was obtained from participants. The physical therapy and nursing staff received education ahead of the implementation of the new protocol. The education

consisted of the importance of ICUAW, prevention of ICUAW with early mobility, appropriate exercises for mobility level, and how to document interventions in the EHR. The predicted outcome improvement is a decrease in ICU length of stay and a decrease in ventilator days.

The ICU Liberation Bundle by the Society of Critical Care Medicine was used to guide the implementation of the early mobility component of the ABCDEF Bundle. This bundle was derived from the Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/ Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU. The application of the ICU Liberation Bundle/ABCDEF Bundle allows for a holistic approach and can be used to treat all patients each day of their critical care stay (Society of Critical Care Medicine, n.d.). Research over the past two decades supports using the ICU Liberation Bundle in critically ill patients to improve both the quality and quantity of life (Waak et al., 2022). The protocol consisted of three steps 1) safety screening 2) choosing the appropriate mobility level 3) criteria for stopping protocol (SCCM, n.d.).

Do

The do phase is the implementation phase and when data is collected (Bailey et al., 2017). The step from Lewin's theory that best corresponds to the implementation phase is the moving process. The moving process indicates movement toward the needed change. The driving forces outweigh the restraining forces (Burnes, 2020; Gearin, 2017). After the education of the physical therapy and nursing staff was completed, the early mobility protocol began being used in critical care. All critical care patients are evaluated using the MRC sum score for ICUAW (MRC, 1943)). If the patient meets the criteria for ICUAW, the early mobility protocol will be initiated. Once implementation was completed data was collected through chart audits, collecting the same data as before implementation.

Study

The study phase consists of analyzing the results of the data collection and comparing them to the data collected before implementation (Christoff, 2018). The data collected will be evaluated to see if the intervention is working. At this point, the DNP student will compare the results to previous data. The comparison allows us to see how to progress and discuss with the stakeholders the need for changes. The study phase is crucial to the process (Christoff, 2018).

Act

The act phase consists of taking what has been learned in the study phase and making changes accordingly (Institute for Healthcare Improvement [IHI], n.d.). The freezing or refreezing process best lines up with the act phase. The refreezing process is when the change becomes a normal part of the patient care routine. There is acceptance and stabilization of the change (Burnes, 2020; Gearin, 2017). If the intervention is successful, the early mobility protocol will be adapted or adopted to meet the needs of the critical care units. If there are any problems found with the intervention, adjustments or a new direction can be made and then a repeat of the PDSA cycle would begin (Christoff, 2018).

One strength of the PDSA model is it is one of the most used models for quality improvement projects (IHI, n.d.). Other strengths include increasing confidence, and flexibility, identifying side effects, and minimizing resistance (National Institute for Children's Health Quality [NICHQ], n.d.). A weakness noted is its simplicity, a more intricate complex problem will need a more complex application of the PDSA model. Another weakness is that the PDSA model is the belief that it can only be used with small groups when it can also be applied to larger groups (Coury et al., 2017).

Data Review Process

Secondary quantitative data will be gathered using audits of patient electronic health records (EHR) before project implementation. Data gathered included ICU length of stay, number of days spent on the ventilator, RN documentation of bedside mobility score, level of mobility, mobility activities performed, and physical therapy consultations. The same data was audited post-implementation. The outcomes to be measured are ICU length of stay and ventilator days. Nursing and physical therapy staff will use the Medical Research Council (MRC) sum score to evaluate each ICU patient for the presence of ICUAW. A score of 48 or less indicates some degree of global muscle weakness (UK Research and Innovation, 2022). Patients with weakness had an MRC sum score performed on admission/ transfer and discharge/ transfer from ICU. Patients exhibiting ICUAW had the early mobility protocol implemented. Patients who have undergone coronary artery bypass graft (CABG) or valve replacement were not included secondary to already having an established mobility protocol.

Upon completion of the implementation period, the same data weas collected from the EHR as pre-implementation. Descriptive statistics will be used to analyze the early mobility nursing documentation. A paired t-test was used to analyze the data collected.

Risk and Benefits

Potential risks to the nursing and physical therapy staff include physical injury. There is also a risk of injury to the patient by a fall, or accidental removal of medical equipment (ETT, IV, catheters, etc.). Another potential risk to the patient would be deterioration (hemodynamic instability or desaturation) of the patient's condition during or after participating in early mobility exercises. The benefits of early mobility for patients include quicker time out-of-bed activities, decreased ICU length of stay, decreased delirium, and decreased MV days.

Timeline

The timeline for the DNP project began in May 2022. In June 2022, I obtained the approval of my preceptor and site. The first stakeholder meeting took place in June 2022. A second stakeholder meeting and approval of the problem took place in July 2022. IRB approval was received in November of 2022. Staff education took place in February 2023 for two weeks. Project implementation began on February 17, 2023, and ended on April 14, 2023. Dissemination of project results to stakeholders occurred in June 2023 (see Appendix F).

Budget and Resources

Resources needed for the implementation of the project will be minimal (see Appendix G). The agency provided education materials, recruitment flyers, MRC sum score and protocol copies, and a family education brochure. No compensation was provided for the participants. Access to data will be obtained through access to the EHR. Software for the creation of quick reference guides and patient/ family education guides will be Microsoft Word and PowerPoint will be used to create the education material for the nursing staff. The DNP student provided consent, snacks, and reminder cards for the chart. The DNP student also provided two locking document bags and two file folders. The locking document bags are for MRC sum scores containing patient information that will be kept in the unit directors' offices. The file folders will be kept in the charge nurse room and contain new documents for the chart.

Evaluation

Statistic Considerations

A two-sample t-test was chosen for the analysis of data. Pre-post-implementation data was compared using the two-sample t-test. Outcomes compared were ventilator days and ICU length of stay. The two-sample t-test was chosen because I had the mean and standard deviation

for each outcome to be measured. It was expected that the standard deviation would not be equal.

Data Maintenance and Security

Data collected through chart audit was maintained on the DNP student's locked computer with facial recognition. Consent forms were housed in the DNP student's office in a locked file cabinet in a locked office. Complete MRC sum score forms were kept in a locked document bag, in the locked office of the ICU directors' offices.

Results

Results of Data Analysis

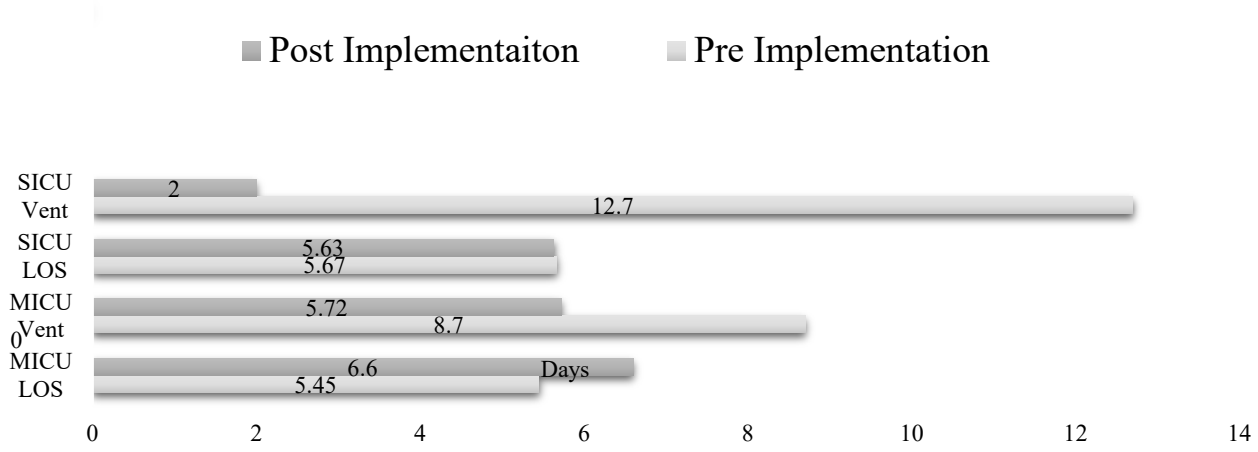
The quality improvement project evaluated patients admitted to MICU and SICU. In MICU, of the 68 evaluated for inclusion in the early mobility protocol 33 (48.53 %) were excluded for not meeting the criteria. Those excluded were patients who scored above 48 on the MRC sum score 26(78.78%) and patients who expired during their ICU admission 7(21.21 %). The remaining 35(51.47%) patients scored 48 or less and were included in the results for ICU LOS and ventilator days. Of the 28 (80%) patients who met inclusion criteria and had complete MRC Sum scores forms, the mean MRC sum score on admission to MICU was 33.75, and the mean MRC sum score on discharge from MICU was 42.82. In SICU, of the 33 evaluated for inclusion in the early mobility protocol 24 (72.72%) were excluded for not meeting the criteria. Those excluded were patients who scored above 48 on the MRC sum score (21; 87.5 %) and patients who expired during their ICU admission (3, 12.5 %). The remaining 11 (33.33%) patients scored 48 or less and were included in the study. Of the 9 (81.81%) patients who met inclusion criteria and had completed MRC sum scores, the mean MRC sum score on admission to SICU was 30.66 and the mean MRC sum score on discharge from SICU was 35.55.

To answer the question Does a nurse-driven early mobility protocol decrease intensive

care unit acquired muscle weakness (ICUAW), ICU LOS, and the number of ventilator days, a t-test was performed. (See Table 1). A two-sample t-test was performed to compare the pre and post-implementation data. The MICU LOS pre-implementation mean (5.45 days) and MICU LOS post-implementation mean (6.60 days) did not show a statistically significant difference (*p-value*- 0.299), and in fact the post implementation mean was higher than the pre-implementation. The MICU ventilator days pre-implementation mean (8.70 days) and MICU ventilator days post implementation mean (5.72 days) showed a decrease in the average number of days spent on the ventilator but was not statistically significant (*p-value*- 0.453). SICU LOS pre-implementation mean (5.67 days), and SICU LOS post-implementation mean (5.63 days) were similar but the differences in means were not statistically significant (*p-value*- 0.9737). The SICU ventilator days pre-implementation mean (9.56 days) and the SICU ventilator days post implementation mean (2 days) showed a significant difference, but the post-implementation data had only one data point and was not statistically significant.

Table 1

Early Mobility in Critical Care: Length of Stay and Vent Days



Discussion

Results indicate that the expected decrease in ICU LOS and ventilator days were not statistically significant. The MICU LOS increased, and the SICU LOS remained relatively the same. Both MICU and SICU ventilator days decreased but neither was significant. This was in part due to the difference in data collection. Prior to the implementation of this project, there was no tool used to diagnose ICUAW; therefore, all patients, except open heart surgery patients admitted to the MICU and SICU were included in the data collection. The data collected from the project included patients with an MRC sum score of 48 or less, narrowing the patient population significantly to just those experiencing weakness. Not all patients were included in the analysis of the MRC sum score but were able to be included in the data collected for LOS and ventilator days. Those not included in the analysis of the MRC sum scores were because the MRC sum score was not completed on both admission and discharge from critical care.

Implications for Clinical Practice

Although not statistically significant, the addition of early mobility did help to lower ventilator days. This is more apparent in MICU because there was a larger sample size than in SICU. The results reflect the potential for a full scale more aggressive implementation of an early mobility protocol in the critical units would be of further benefit.

Implications for Healthcare Policy

A formal policy for early mobility needs to be implemented in the critical care area. The policy should be modeled after the early mobility portion of the Liberation Bundle by the SCCM, emphasizing the use of the ABCDEF Bundle. This would fall in line with the recommendations from the SCCM that all ICUs should use the ABCDEF Bundle to improve patient outcomes.

Implications for Quality/ Safety and Education

Quality and safety will always be important to any policy. During implementation, no adverse events were reported. Early mobility has been proven safe and effective. Designated physical therapy and respiratory staff would help ensure safety during early mobility activities. Successful implementation requires consistent and repeated education about early mobility, its benefits, documentation, and how best to achieve the goals set by the agency.

Limitations

Several limitations have been identified. The first limitation is buy-in by the nursing staff. During the education process, most nurses showed an interest in the knowledge and plan to implement the protocol. Staff and ICU directors were also interested to see improved patient mobility and decreased LOS and ventilator days. As implementation proceeded it became evident that there was limited buy-in to complete the documentation or MRC sum score. Leadership in the critical care units supported the protocol implementation. However, there was a difference in the involvement of each unit director related to documentation, completion of the MRC sum score, and follow-through of appropriate mobility activities. The degree of leadership involvement had a direct effect on the number of patients evaluated and included in the project results. Another limitation is the current work environment, the units are understaffed, and feel it is difficult to add another task to the day. Another factor affecting the work environment involved the organization being managed by a corporate headquarters located in another state. There has been immense pressure placed on the directors and staff to make improvements. The constant pressure has led to frustration and decreased morale. Completion of the MRC sum score on each patient did not occur as needed, which led to a failure to capture data on each patient that met the criteria to be included in the project. The next limitation is the small sample size and

single agency project within critical care. Lastly, by only evaluating the MRC sum score on admission and discharge of ICU, patients who experienced a significant event after admission to the ICU but recovered prior to discharge were not captured for inclusion.

Dissemination

The results of the project were presented to graduate faculty and students during the annual dissemination day. The DNP student returned to the agency and presented the results of the project to the directors of critical care. Handouts with the results were given to the staff of MICU and SICU.

Sustainability

Sustainability can be achieved through the continued implementation of the ABCDEF bundle in critical care for every critical care patient. Continued monitoring of outcomes will help drive sustainability. Yearly training, especially for new nurses will help increase confidence in the evidence-based protocol.

Plans for Future Scholarship

In the future, I would recommend completing the MRC sum score on admission and discharge from the ICU, as well as if any significant event occurred during the ICU stay (surgery, mechanical ventilation, worsening condition affecting muscle strength). Another recommendation would be to work with staff, physicians, and the EHR liaison to create an order set for the implementation of early mobility. An order set would then be able to generate the appropriate orders, tasks, and prompts needed to help promote early mobility more effectively.

Conclusion

Early mobility continues to be a safe and effective way to prevent or slow ICUAW. Although the results of the project do not reflect statistical significance within this facility,

improvements were still seen. Many barriers limited successful implementation. Those barriers do not negate the clinical implications and small victories experienced during the early mobility implementation project. Continued implementation and resolution of limitations will allow for improved patient outcomes of the critical care patient through early mobility.

References

Abd el-shafy, I., Zapke, J., Sargeant, D., Prince, J., & Christopherson, N. A.M. (2019). Decreased pediatric trauma length of stay and improved disposition with implementation of Lewin's Change Model. *Society of Trauma Nurses, 26(2),* 84-88. https://doi.org/10.1097/jtn.0000000000000426

Anekwe, D.E., Biswas, S., Bussieres, A., & Spahija, J. (2020a). Early rehabilitation reduces the likelihood of developing intensive care unit-acquired weakness: A systematic review and meta-analysis. *Physiotherapy, 107, 1-10*. https://doi.org/10.1016/j.physio.2019.12.004.

Anekwe, D.E., Milner, S.C., Bussieres, A., de Marchie, M., & Spahija, J. (2020b). Intensive care unit clinicians identify many barriers to, and facilitators of, early mobilization: A qualitative study using the Theoretical Domains Framework. *Journal of Physiotherapy, 66 (2020), 120-127.* https://doi.org/10.1016/j.jphys.2020.03.001

Baby, S., George, C., & Osahan, N. M. (2021). Intensive care unit-acquired neuromuscular weakness: A prospective study on incidence, clinical course, and outcomes. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine, 25*(9), 1006-1012. https://doi.org/10/5005/jp-journals-10071-23975

Bailey, C., Hewison, A., Orr, S., & Baernholdt, M. (2017). Learning about end-of-life care in nursing- A global classroom educational innovation. Journal of Nursing Education, 56 (11), 588-691. https://doi.org/10.3928/01484834-20171020-10.

Bilodeau, C. Gallagher, F., & Tanguay, A. (2018). Early mobilization of mechanically ventilated patients: Nursing practice in Quebec intensive care units. *The Canadian Journal of Critical Care Nursing, 29*(4), 21-28.

https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcaccn.ca%2Ffiles%2F29-4-2018%2520CJCCN.pdf%23page%3D21&data=05%7C01%7Cwokey%40jsu.edu%7C10707eaf5508491d8c2f08db86f96284%7C32f44c14cd0e4539b7633c860a76727a%7C0%7C0%7C638252177938723762%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=ueo%2BHU3M3giVDjexo4YZQhGQj1wX30oaMJoMRhha66I%3D&reserved=0

Burnes, B. (2020). The origin of Lewin's Three-Step Model of Change. *The Journal of Applied Behavioral Science, 56 (1),* 32-59. https://doi.org/10.1177/0021886319892685.

Chen, Y-H., Hsiao, H-F., Li, L-F., Chen, N-H., & Huang, C-C. (2019). Effects of electrical muscle stimulation in subjects undergoing prolonged mechanical ventilation. *Respiratory Care, 64(3),* 262-271. https://doi.org/10.4187/respcare.05921

Clarissa, C., Salisbury, L., Rodgers, S., & Kean, S. (2019). Early mobilisation in mechanically ventilated patients: A systemic integrative review of definitions and activities. Journal of Intensive Care, 7(3), 1-19. https://doi.org/10.1186/s40560-018-0355-z

Christoff, P. (2018). Running PDSA cycles. *Current Problems in Pediatric and Adolescent Health Care, 48,* 198-201. https://doi.org/10.1016/j.cppeds.2018.08.006

Colbenson, G.A., Johnson, A., & Wilson, M. (2019). Posi-intensive care syndrome: Impact, prevention, and management. *Breathe, 15,* 98-101. https://doi.org/10.1183/20734735.0013-2019

Cook, N.F., Braine, M.E., O'Rourke, C. & Nolan, S. (2022). Assessment of motor limb strength by neuroscience nurses: Variations in practice and associated challenges. *British Journal of Nursing, 31(20), 1033-1039*. https://doi.org/10.12968/bjon.2022.31.20.1033

Cooper, D., Gaspernini, M., & Parkosewich, J.A. (2021). Nurses' perceptions of barriers to out-of-bed activities among patients receiving mechanical ventilation. *American Journal of Critical Care, 30(4),* 266-273. https://doi.org/10.4037/ajcc2021801

Coury, J., Schneider, J.L., Rivelli, J.S., Petrik, A.F., Seibel, E., D'Agonstini, B., Taplin, S.H., Green, B.B., & Coronado, G.D. (2017). Applying the Plan-Do-Study-Act (PDSA) approach to a large pragmatic study involving safety net clinics. *BMC Health Services Research, 17*. https://doi.org/10.1186%2Fs12913-017-2364-3

Devlin, J. W., Skrobik, Y., Gélinas, C., Needham, D. M., Slooter, A. J. C., Pandharipande, P. P., Watson, P. L., Weinhouse, G. L., Nunnally, M. E., Rochwerg, B., Balas, M. C., van den Boogaard, M., Bosma, K. J., Brummel, N. E., Chanques, G., Denehy, L., Drouot, X., Fraser, G. L., Harris, J. E., . . . Alhazzani, W. (2018). Clinical practice guidelines for the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult patients in the ICU. *Critical Care Medicine, 46*(9), e825-e873. https://10.1097/CCM.0000000000003299

Dong, Z., Liu, Y., Gai, Y., Meng, P., Lin, H., Zhoa, Y., & Xing, J. (2021). Early rehabilitation relieves diaphragm dysfunction induced by prolonged mechanical ventilation: A randomized control study. *BMC Pulmonary Medicine, 21, 106.* https://doi.org/10.1186/s12890-021-01461-2

Fontela, P.C., Glaeser, S.S., Martins L.FG., Condessa, R. L., Prediger, D.T., Forgiarini Jr., L.A., Lisboa, T.C., & Friedman, G. (2021). Medical Research Council scale predicts spontaneous breathing trial failure and difficult or prolonged weaning of critically ill individuals. *Respiratory Care, 66(5),* 733- 741. https://doi.org/10.4187/respcare.07739

Fuest, K., Ulm, B., Daum, N., Lindholtz, M., Lorenz, M., Blobner, K., Langer, N., Hodgson, C. Herridge, M., Blobner, M., & Schaller, S.J. (2023). Clustering of critically ill patients using an individualized learning approach enables dose optimization of mobilization in the ICU. *Critical Care, 27(1).* https://doi.org/10.1186/s13054-022-04291-8

Gama Lordello, G. G., Gonçalves Gama, G. G., Lago Rosier, G., De Carvalho Viana, P. A. D., Correia, L. C., Fonteles Ritt, L. E. (2020). Effects of cycle ergometer use in early mobilization following cardiac surgery: A randomized controlled trial. *Clinical Rehabilitation 34* (4). 450-459. https://doi.org/10.1177/0269215520901763

Garcia-Perez de Sevilla, G. & Sanchez-Pinto, B. (2023). Effectiveness of physical exercise and neuromuscular electrical stimulation interventions for preventing and treating intensive care unit-acquired weakness: A systematic review of randomized controlled trials. *Intensive & Critical Care Nursing, 74, 103333*. https://doi.org/10.1016/j.iccn.2022.103333

Gearin, C.A. (2017). New higher education president integration: Change and resistance viewed through social power bases and a change model lens. *Journal of Higher Education Policy and Management, 39 (5),* 559-574. https://doi.org/10.1080/1360080X.2017.1354768

Grass, N. & Bundy, E. (2021). Postdischarge nausea and vomiting risk assessment in breast and gynecologic surgical patients. *Journal of PreAnesthesia Nursing, 36,* 339-344. https://doi.org/10.1016/j.jopan.2020.09.008

Gutierrez-Arias, R.E., Zapata-Quiroz, C.C., Prenafeta-Pedemonte, B.O., Nasar-Lillo, N.A., & Gallardo- Zamorano, D.I. (2021). Effect of neuromuscular electrical stimulation on the duration of mechanical ventilation. *Respiratory Care, 66 (4),* 679-685. https://doi.org/10.4187/respcare.08363

Harrison, R., Fischer, S., Walpola, R.L., Chauhan, A., Babalola, T., Mears, S., & Le-Doa, H. (2021). Where so models for change management, improvement and implementation meet? A systematic review of the applications of change management models in healthcare. *Journal of Healthcare Leadership, 13*, 85-108. http://doi.org/10.2147/JHL.S289176

Hickman, C.E., Montecinos-Munoz, N.R., Casenares-Zapatero, D., Arriagada-Garrido, R.S., Jeria-Blanco, U., Gizzatullin, T., Roeseler, J., Dugernier, J., Wittebole, X. & Laterre, P.F. (2021). Acute effects of sitting out of bed and exercise on lung aeration and oxygenation in critically ill subjects. *Respiratory Care, 66(2),* 253-262. https://doi.org/10.4187/respcare.07487

Hodgson, C. L., & Tipping, C. L. (2017). Physiotherapy management of intensive care unit acquired weakness. *Journal of Physiotherapy, 63*(1), 4-10. https://doi.org/10.1016/j.jphys.2016.10.011

Institute for Healthcare Management. (n.d.). *Science of improvement*: *How to improve.* How to Improve. Retrieved November 13, 2020. https://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx

Krupp, A., Stegge, L., & King, B. (2018). A systematic review evaluating the role of nurses and processes for delivering early mobility interventions in the intensive care unit. *Intensive & Critical Care Nursing, 47, 30-38*. https://doi.org/10.1016/j.iccn.2018.04.003

Lewin, K. (1997). *Resolving social conflicts and field theory in social science*. American Psychological Association: Washington D.C.

Liew, S.M., Mordiffi, S.Z., Ong, Y.J.A., & Lopez, V. (2021). Nurses' perceptions of early mobilisation in the adult intensive care unit: A qualitative study. *Intensive & Critical Care Nursing, 66 (2021) 103039.* https://doi.org/10.1016/j.iccn.2021.103039

Linke, C.A., Chapman, L.B., Berger, L.J., Kelly, T.L., Korpela, C.A., & Petty, M.G. (2020). Early mobilization in the ICU: A collaborative, integrated approach. Critical Care Explorations, 2, e0090. https://doi.org/10.1097/cce.0000000000000090

Liu, M., Luo, J., Zhou, J., & Zhu, X. (2020). Intervention effect of neuromuscular electrical stimulation on ICU acquired weakness: A meta-analysis. *International Journal of Nursing Sciences, 7,* 228-237. https://doi.org/10.1016/j.ijnss.2020.03.002

Mangaliso, M.P., Mangaliso, N.A., Nganda, L.Z.B., & Jean-Denis, H. (2021). Contextualizing organization change management in Africa: Incorporating the core values of Ubuntu. *Journal of African Business, 23(4),* 1029-1048. https://doi.org/10.1080/15228916.2021.1984817

Marra, A., Ely, E.W., Pandharipande, P.P., & Patel, M.B. (2017). The ABCDEF bundle in critical care. *Critical Care Clinics, 33(2): 225–243*. https://doi.org/10.1016/j.ccc.2016.12.005

McCarty, C.A., Renier, C.M., Conway, P/G/, Vogel, L., Woehrle, T.A, Anderson, L.A., Hanson, E.J. Benrud, L.M., & Gerchman-Smith, M. (2022). Development, implementation, and evaluation of an early mobility protocol in a regional level II trauma center. *Critical Care Nursing Quarterly, 45(1*), 83-87. https://doi.org/10.1097/cnq.0000000000000391

McWilliams, D., Atkins, Hodson, J., & Snelson, C. (2017). The Sara Combilizer as an early mobilization aid for critically ill patients: A prospective before and after study. *Australian Critical Care, 30, 189-195*. https://doi.org/10.1016/j.aucc.2016.09.001

Medical Research Council. (1943). *Aids to the investigation of the peripheral nervous system*, [Pamphlet], HMSO. MRC-011221 AidsToTheExaminationOfThePeripheralNervousSystem.pdf (ukri.org)

Medrinal, C., Prieurl, G., Bonneveil, T., Gravierl, F., Mayard, D., Desmalles, E. Smondack, P., Lamia, B., Combret, Y. & Fossat, G. (2021). Muscle weakness, functional capacities, and recovery for COVID-19 ICU survivors. *BMC Anesthesiology, 21, 64* https://doi.org/10.1186/s12871-021-01274-0

Moran, K., Burson, R., & Conrad, D. (2020). The Doctor of Nursing Practice project: A framework for success. (3rd Edition). Jones & Bartlett Learning.

National Institute for Children's Health Quality. (n.d.). 4 benefits to testing before implementing change. Retrieved November 13,2022 https://www.nichq.org/insight/4-benefits-testing-implementing-changes

Nickels, M.R., Aitken, L.M., Barnett, A.G., Walsham, J., King, S., Gale, N. E., Bowen, A.C., Peel, B.M., Donaldson, S.L., Mealing, S.T.J., & McPhail, S.M. (2020). Effect of in-bed cycling on acute muscle wasting in critically ill adults: A randomised clinical trial. *Journal of Critical Care Medicine, 59,* 86-93. https://doi.org/10.1016/j.jcrc.2020.05.008.

Nydahl, P., Sricharoenchai, T., Chandra, S., Kundt, F.S., Huang, M, Fischill, M., & Needham, D.M. (2017). Safety of patient mobilization and rehabilitation in the intensive care unit: Systematic review with meta-analysis. *Annals of American Thoracic Society, 14(5),* 766-777. https://doi.org/10.1513/AnnalsATS.201611-843SR.

Raurell-Torreda`, M., Rivera-Arias, S., Marti`, J.D., Frade-Mera, M.J.., Zaragoza-Garcia, I., Gallart, E., Velasco-Sanz, T.R., San Jose`-Arribas, A., & Blazquez-Martinez, E. (2021). Care and treatments related to intensive care unit- acquired muscle weakness: A cohort

study. *Australian Critical Care, 34 (2021), 435-445.* https://doi.org/10.1016/j.aucc.2020.12.005

Santos de Queiroz, R., Saquetto, M. B., Martinez, B.M., Cazeta, B.B.R., Hodgson, C., & Gomes-Neto, M. (2020). Progressive active mobilization with dose control and training load in critically ill patients (PROMOB): Protocol for a randomized controlled trial. *PLoS ONE,* 15(9). https://doi.org/10.1371/journal.pone.0238352

Schallom, M., Tymkew, H., Vyers, K., Prentice, D., Sona, C., Norris, T., & Arroyo, C. (2020). Implementation of an interdisciplinary AACN early mobility protocol. *Critical Care Nurse, 40*(4), e7-e17. https://doi.org/10.4037/ccn2020632.

Silva, J. R., Reboredo, M.M., Bergamini, B.C., Netto, C. B., Vieira, R.S., Pinto, P.S., Fonseca, L.M., & Pinheiro, B.V. (2020). Impact of early passive exercise with cycle ergometer on ventilator interaction. *Respiratory Care, 65*(10), 1547-1554. https://doi.org/10.4187/respcare.07517

Society of Critical Care Medicine. (n.d.). ICU liberation bundle (A-F). ICU Liberation. https://www.sccm.org/ICULiberation/ABCDEF-Bundles

Stahley, L., O'Brien, P.B., Lowe, M., Porteous, P., & Austin, S. (2020). The impact of bed traffic control and improved flow process on throughput measures in a metropolitan emergency department. *Journal of Emergency Medicine, 46(5),* 682-692. http://orcid.org/0000-0001-6259-7779

The W. Edwards Deming Institute (2023). *The PDSA Cycle*. https://deming.org/explore/pdsa/

Turan, Z., Topaloglu, M., & Taskiran, O.O. (2020). Medical Research Council- sumscore: A tool for evaluating muscle weakness in patients with post-intensive care syndrome. *Critical Care*, 24, 562. https://doi.org/10.1186/s13054-020-03282-x

UK Research and Innovation. (2022). MRC Muscle Scale. https://www.ukri.org/councils/mrc/facilities-and-resources/find-an-mrc-facility-or-resource/mrc-muscle-scale/

Valdez dos Santos, F., Cipriano, G., Vieira, L., Chiappa, A.D.G., Cipriano, G.B.F., Vieira, P., Zago, J.G., Castilhos, M., da Silva, M.L., & Chiappa, G.R. (2020). Neuromuscular electrical stimulation combined with exercise decreases duration of mechanical ventilation in ICU patients: A randomized controlled trial. *Physiotherapy Theory and Practice, 36*(5), 580-588. https://doi.org/10.1080/09593985.2018.1490363

Vanhorebeek, I., Latronico, N., & Van den Berghel, G. (2020). ICU- acquired weakness. *Intensive Care Medicine, 46,* 637–653. https://doi.org/10.1007/s00134-020-05944-4

Veldema, J., Bosl, K., Kugler, P., Ponfick, M., Gdynia, H., & Nowak, D.A. (2019). Cycle ergometer training vs resistance training in ICU-acquired weakness. *Acta Neurologica Scandanavica*, *140*, 62-71. https://doi.org/10.1111/ane.13102.

Vollenwider, R., Manettas, A.I., Hani, N., de Bruin, E.D., & Knois, R.H. (2022). Passive motion of the lower extremities in sedated and ventilated patients in the ICU- a systematic review of early effects and replicability of interventions. *PLoS ONE, 17*(5), 1-21. https://doi.org/10.1371/journal.pone.0267255

Waak, M., Harnischfeger, J., Ferguson, A., Gibbons, K., Nguyen, K.H., & Long, D. (2022). Every child, every day, back to play: The PICUstars protocol- implementation of a nurse-led PICU liberation program. *BMC Pediatrics, 22*(279). https://doi.org/10.1186/s12887-022-03232-2.

Waldauf, P., Gojda, J., Urban, T., Hruskova, N., Blahutova, B., Hejnova, M., Jiroutkova, K., Fric, Jansky, P., Kukulova, J., Stephens, F., Rasova, K. & Duska, F. (2019). Functional

electrical stimulation-assisted cycle ergometry in the critically ill: Protocol for a randomized controlled trial. *Trials*, *20*(724), 3-11. https://doi.org/10.1186/s13063-019-3745-1

Wang, J., Ren, D., Liu, Y., Wang, Y., Zhang, B., & Xiao, Q. (2020a). Effects of early mobilization on the prognosis of critically ill patients: A systematic review and meta-analysis. *International Journal of Nursing Studies, 110*, 103708. https://doi.org/10.1016/j.ijnurstu.2020.103708

Wang, W., Xu, C., Ma, X., Zhang, X., & Xie, P. (2020b). Intensive care unit-acquired weakness: A review of recent progress with a look toward the future. *Frontiers in Medicine, 7.* https://10.3389/fmed.2020.559789

Winkelman, C., Sattar, A., Momotaz, H., Johnson, K.D., Morris, P., Rowbottom, J.R., Thornton, J.D., Feeney, S., & Levine, A. (2018). Dose of early therapeutic mobility: Does frequency or intensity matter*? Biological Research for Nursing, 20(5), 522-530*. https://doi.org/10.1177/1099800418780492

Winkelman, C., Vollman, K., & Engel, H. (2020). *Early mobility.* ICU Liberation. (2nd ed.). Society of Critical Care Medicine.

Appendix A

SWOT Analysis

Strengths: Staff works well together and positive interest from leadership. Part of the protocol is already available in the electronic health record (EHR).
Weaknesses: Training and education of the leadership and staff. Currently no standardized protocol for early mobility and lack of consistent documentation practices. Staff buy-in, increased time required by staff, and motivation. Availability of needed equipment to provide early mobility to patients (recliner, rollators with O2 tank holder, lift equipment).
Opportunities: Increase the mobility of patients in critical care. Decrease intensive care unit (ICU) length of stay and ventilator days.
Threats: Increase in costs if equipment needs to be purchased. Inability to tailor the EHR to the specific needs of the facility.

Appendix B

DNP Project Recruitment Flyer

Early Mobility Education Project

Objective: Introduction of Nurse Driven Early Mobility Protocol

- **ICU Acquired Weakness: What is it?**
- **Early Mobility: Why is it important?**
- **As physical therapy and nursing staff, how can you help?**

As physical therapy and nursing staff in ICU, early mobility is vital to improving patient outcomes and preventing ICU Acquired weakness.

Join Wendy Key, a Doctor of Nursing Practice student for a presentation on:

A Nurse Driven Early Mobility Program in Critical Care Project

Dates: 2/7, 2/10, 2/14

Times: 1300, 1730, 2130

Place: MICU Waiting Room

Follow-up educations session may be needed

Participation in the DNP project is voluntary and not participating will not affect your employment or result in the loss of benefits.

Early Mobility Education Project

Objective: Introduction of Nurse Driven Early Mobility Protocol

- **ICU Acquired Weakness: What is it?**
- **Early Mobility: Why is it important?**
- **As physical therapy and nursing staff, how can you help?**

As physical therapy and nursing staff in ICU, early mobility is vital to improving patient outcomes and preventing ICU Acquired weakness.

Join Wendy Key, a Doctor of Nursing Practice student for a presentation on:

A Nurse Driven Early Mobility Program in Critical Care Project

Dates: 2/7, 2/10, 2/14

Times: 1500, 1700, 2200

Place: SICU Breakroom

Follow-up educations session may be needed

Participation in the DNP project is voluntary and not participating will not affect your employment or result in the loss of benefits.

Appendix C

Participant Consent Form

Informed Consent for the DNP project:

Implementation of a Nurse Driven Early Mobility Protocol in Critical Care for the Reduction if Intensive Care Unit Acquired Weakness (ICUAW)

Project Purpose

The purpose of the project is to implement an early mobility protocol in the critical care area that will allow the nursing staff to begin mobility exercises as appropriate. Through early mobility the goal is to decrease ICUAW. The expected patient outcomes are a decrease of ventilator days and ICU length of stay.

Project Procedure

The nursing staff will evaluate each critical care patient for ICUAW using the Medical Research Council (MRC) Sum Score and complete a bedside mobility score in the electronic health record (EHR). Based on the level scored on the bedside mobility score will dictate which level mobility exercises the patient will receive. Patients scoring less than 48 on the MRC sum score will have a physical therapy (PT) consultation and evaluation. Once the PT consult is completed the physical therapy and nursing staff will move forward with appropriate level mobility exercises three times a day, once by physical therapy, once by day shift nursing staff and once by night shift nursing staff.

Project Location

Project implementation will be in the critical units of Gadsden Regional Medical Center

Project Length of Time

The estimated length of time is three months.

Estimated Time Commitment from Participant

The educational session will last 30-60 minutes. Daily time spent assisting with patient exercises is 15-30 minutes per patient.

Potential Risks

The risks to both the nursing and physical therapy staff are low. There is a risk of physical injury while performing mobility exercises. Participants are encouraged to seek assistance from other staff during patient exercises if they believe they may be injured. If injury were to occur, the participant would need to notify the DNP student, charge nurse, and unit director. The participant would then need to follow the agency protocol for injuries while at work.

Confidentiality

Identifying Data

The MRC sum score will contain patient data that will be kept confidential by having the form kept with the patient chart while in the critical care unit and turned in to the unit directors and kept in their offices until picked up by the DNP student. There will be no identifying data of the nursing and physical therapy staff.

Participants consent form and sign-in sheets from educational settings will be kept in a locked desk by the DNP student.

Records

The data collected from the EHR for the DNP project will be kept on the DNP student's computer. The computer has password and facial recognition locked. The data collected will be kept for one year.

Benefits of DNP project

Benefits of early mobility include decrease in ventilator days, decreased length of ICU and hospital stay, decreased episodes of delirium, decreased time to out of bed activities, and decrease in costs to both patient and agency.

Participation is voluntary

Participation in the DNP project is voluntary. Choosing to not participate in this project will not affect your employment or result in loss of benefits.

Withdrawal statement

Participants have the right to withdraw from the study at any time. Contact Wendy Key if you no longer want to participate.

Contact for questions

Wendy Key

wokey@jsu.edu

256-504-3522

SIGNATURE PAGE OF CONSENT FORM

FOR RESEARCH INVOLVING ADULTS

Permission Form for

Research on

Implementation of Nurse Driven Early Mobility Protocol in Critical Care for the Reduction of Intensive Care Unit Acquired Weakness (ICUAW)

Title of Project

I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description.

I _____ agree to participate in the study.

Complete Name

_____ _____

Signature

Informed Consent for the DNP project:

Implementation of a Nurse Driven Early Mobility Protocol in Critical Care for the Reduction if Intensive Care Unit Acquired Weakness (ICUAW)

Project Purpose

The purpose of the project is to implement an early mobility protocol in the critical care area that will allow the nursing staff to begin mobility exercises as appropriate. Through early mobility the goal is to decrease ICUAW. The expected patient outcomes are a decreases of ventilator days and ICU length of stay.

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Project Location

Project implementation will be in the critical units of Gadsden Regional Medical Center

Project Length of Time

Estimated length of time is three months.

Estimated Time Commitment from Participant

The educational session will last 30-60 minutes. Daily time spent assisting with patient exercises is 15-30 minutes per patient.

Potential Risks

The risks to both the nursing and physical therapy staff are low. There is a risk of physical injury while performing mobility exercises. Participants are encouraged to seek assistance from other staff during patient exercises if they believe they may be injured. If injury were to occur, the participant would need to notify the DNP student and clinical instructor. The participant would then need to follow the university protocol for injuries while in the clinical area.

Confidentiality

Identifying Data

The MRC sum score will contain patient data that will be kept confidential by having the form kept with the patient chart while in the critical care unit and turned in to the unit directors and kept in their offices until picked up by the DNP student. There will be no identifying data of the nursing and physical therapy staff.

Participants consent form and sign-in sheets from educational settings will be kept in a locked desk by the DNP student.

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Benefits of early mobility include decrease in ventilator days, decreased length of ICU and hospital stay, decreased in episodes of delirium, decreased time to out of bed activities, and decrease in costs to both patient and agency.

Participation is voluntary

Participation in the DNP project is voluntary. Choosing to not participate in this project will not affect your grade or clinical opportunities.

Withdrawal statement

Participants have the right to withdraw form the study at any time. Contact Wendy Key if you no longer want to participate.

Contact for questions

Wendy Key

wokey@jsu.edu

256-504-3522

SIGNATURE PAGE OF CONSENT FORM

FOR RESEARCH INVOLVING ADULTS

Permission Form for

Research on

Implementation of Nurse Driven Early Mobility Protocol in Critical Care for the Reduction of Intensive Care Unit Acquired Weakness (ICUAW)

Title of Project

I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description.

I _____ agree to participate in the study.

Complete Name

_____ _____

Signature

Appendix D

JSU IRB Approval Letter

Institutional Review Board for the Protection of Human Subjects in Research
249 Angle Hall
700 Pelham Road North
Jacksonville, AL 36265-1602

November 14, 2022

Wendy Key
Jacksonville State University
Jacksonville, AL 36265

Dear Wendy:

Your protocol for the project titled "Implementation of a Nurse Driven Early Mobility Protocol in Critical Care to Reduce Intensive Care Unit Acquired Weakness (ICUAW)" protocol number 11142022-03 has been granted exemption by the JSU Institutional Review Board for the Protection of Human Subjects in Research (IRB).

If your research deviates from that listed in the protocol, please notify me immediately. One year from the date of this approval letter, please send me a progress report of your research project.

Best wishes for a successful research project.

Sincerely,

Jennifer Mead
Senior Human Protections Administrator, Institutional Review Board

Wendy Key

From: Lynn Garner <lgarner@jsu.edu>
Sent: Monday, January 30, 2023 8:54 AM
To: Wendy Key; Jennifer Mead
Cc: Cheryl Emich
Subject: RE: IRB Amendment Request

Dear Wendy,

I checked with the IRB Chair. She said that this is fine since you are only changing the timeframe.
Thanks for letting us know.
Best,

Lynn Garner
Assistant Director, Office of Sponsored Programs
Associate Human Protections Administrator, Institutional Review Board
Administrator, Faculty Research Grants
Administrator, Institutional Animal Care and Use Committee
Jacksonville State University
P. 256.782.8159 | F. 256.782.8146
249 Angle Hall
700 Pelham Road North | Jacksonville, AL 36265
WWW.JSU.EDU |
The Friendliest Campus in the South.

From: Wendy Key <wokey@jsu.edu>
Sent: Monday, January 30, 2023 8:37 AM
To: Lynn Garner <lgarner@jsu.edu>; Jennifer Mead <jmead@jsu.edu>
Cc: Cheryl Emich <cemich@jsu.edu>
Subject: IRB Amendment Request

Mrs. Garner or Meade
I have attached a request for an amendment to my original IRB application. Also attached are the initial application and approval letter.

Thank you,

Wendy Key MSN, RN, CCRN

Instructor

College of Health Professions and Wellness

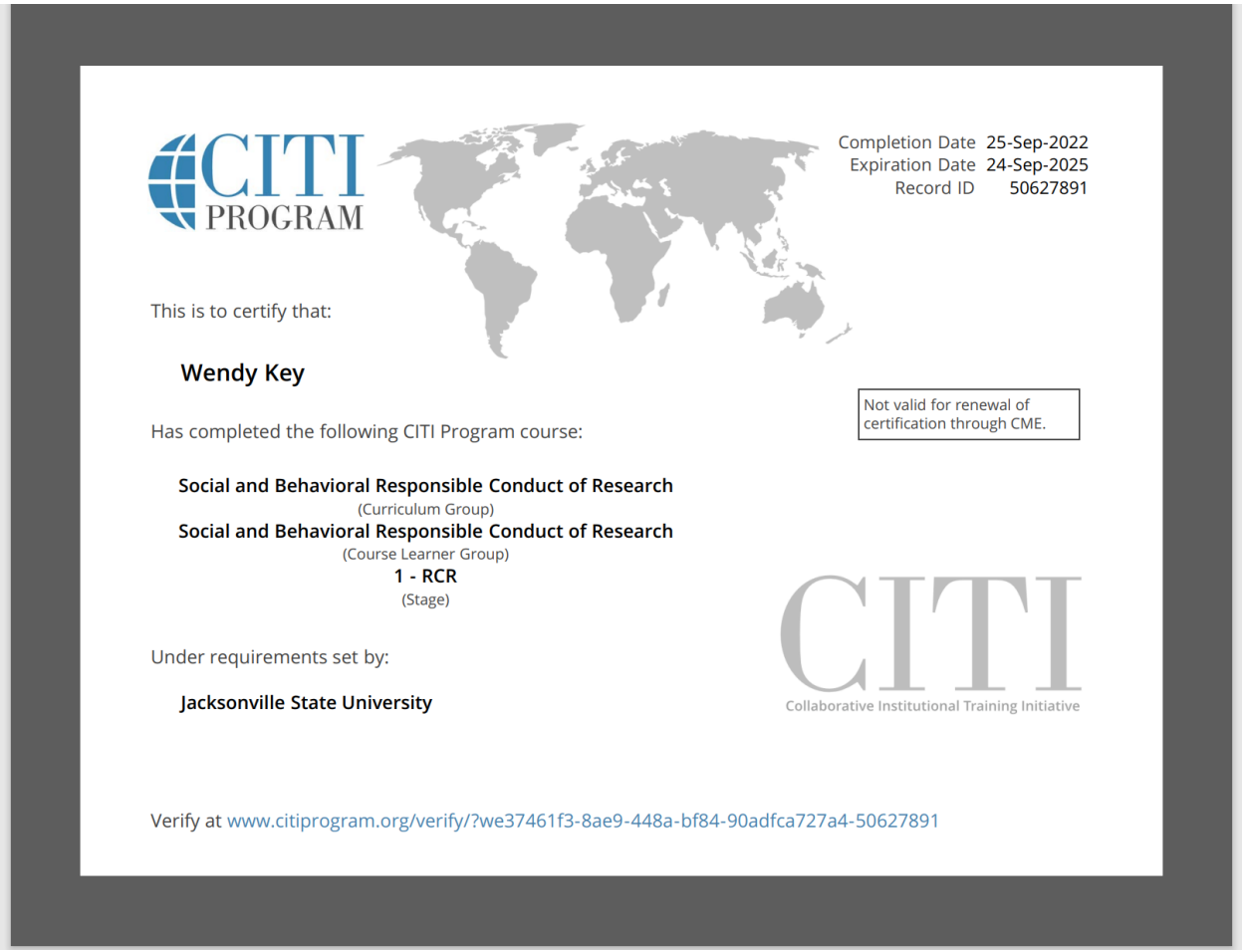
School of Nursing

Jacksonville State University

1701 Pelham Road South

Appendix E

CITI Training Certificate



CITI PROGRAM

Completion Date 25-Sep-2022
Expiration Date 24-Sep-2025
Record ID 50627891

This is to certify that:

Wendy Key

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

Social and Behavioral Responsible Conduct of Research
(Curriculum Group)
Social and Behavioral Responsible Conduct of Research
(Course Learner Group)
1 - RCR
(Stage)

Under requirements set by:

Jacksonville State University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?we37461f3-8ae9-448a-bf84-90adfca727a4-50627891

Appendix F

Project Timeline

Task	May 2022	June 2022	July 2022	August 2022	September 2022	October 2022	November 2022	December 2022
Obtained Preceptor	X							
Stakeholders Meeting		X	X					
Received Approval of Problem by Stakeholders			X					
Receive IRB Approval							X	
Task	January 2023	February 2023	March 2023	April 2023	May 2023	June 2023	July 2023	August 2023
IRB Approval of Amendment		X						
Stakeholder Meeting	X	X						
Staff Education		X						
Implementation		X	X	X				
Stakeholder Meeting			X	X				

Disseminate Findings to Agency						X		
Present at JSU Dissemination Day							X	
Graduation								X

Appendix G

Budget and Resources

Locking Document Bags x2	$33.99
Cardstock Paper	$5.99
Snacks	$50
Copy Paper	$4.99