MOBILITY GUIDELINE UTILIZATION

Utilization of the Critical Care Mobility Guideline in the Medical Intensive Care Unit

DNP Final Project

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By
Michele L. Dye, MS, RN, CCRN, CCNS, ANP-BC

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DNP Project Committee:
Gerene S. Bauldoff, Ph.D., R.N., F.A.A.N., Advisor
Elizabeth Barker, Ph.D., R.N., committee member
Linda Daley, Ph.D., R.N., committee member

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**Abstract**

**Introduction:** The Critical Care Mobility Guideline was implemented in the medical intensive care units (MICU) in a large Midwestern medical center in June 2008.

**Objective:** To determine if MICU patients are received mobility interventions as directed by the Critical Care Mobility Guideline on days 3, 5, & 7 of their stay.

**Design:** A quantitative descriptive research design using retrospective medical record review was used to examine the utilization of mobility measures as recommended in the Mobility Guideline.

**Sample:** All MICU patients (n=207 on day 3) during September-November 2010 and who met inclusion criteria.

**Outcome measurement:** The number of patients who received at least one mobility intervention on days 3, 5, & 7. Other data collected included: type of mobility intervention; time of day of the mobility intervention; SAPS II score, BMI.

**Conclusions:** The number of patients who received mobility interventions varied and increased as the medical ICU length of stay increased. The percentage of eligible patients on day 3 who received mobility was 29.75%, and increased to 43.5% on day 7. The most common mobility intervention was out of bed to the bedside chair in the morning. Most common exclusion criterion was hemodynamic instability. The SAPS II score showed negative, non-significant correlation to mobility interventions. The utilization of the mobility guideline in MICU patients is not widespread with less than 50% of the patients without exclusion criteria received mobility interventions. Factors such as day of ICU stay, BMI did not affect whether or not a patient received mobility.

## Chapter 1: Nature of the Project

**Introduction:**

The hazards of immobility have been described in the health care literature since the late 1960's. Many patients who are admitted to hospitals in the United States are placed on bed rest by the health care team. The combination of the patient's acute illness, baseline health status, and the requirement of bed rest has several potential negative consequences for the patient. In February 2008, a multi-disciplinary team of health care providers at an academic medical center met and developed a mobility guideline for critical care patients. This evidenced- based guideline was to be used to guide the critical care bedside registered nurse in daily assessment and intervention of the mobility needs for critically ill patients. The Critical Care Mobility Guideline was implemented in three intensive care units (ICU's) and 2 progressive care units (PCU's) at an academic medical center in June 2008.

**Guideline Development:**

The University of Iowa Model of Evidence-Based Practice is used at the Ohio State University Medical Center. The Critical Care Mobility Task Force (subsequently referred to as "the task force") used this model to develop the guideline. The initial step was identification of the knowledge focused triggers including several published articles demonstrating that mobility for critically ill patients was safe. Secondly, there was the desire to change the long-held institutional practice of not mobilizing patients who were located in one of the medical center's ICU's. The chair of the task force developed a proposal to discuss with the Department of Critical Care Nursing's Quality Improvement Committee. This proposal included a review of the current health care literature related to mobility in critical illness.

The Department of Critical Care Nursing's Quality Improvement Committee (Nursing QI Committee) discussed the issue of mobilizing patients in the critical care units. This committee determined that the topic was a priority for the Department of Critical Care Nursing. The scope of the committee is not large enough to determine whether or not a topic is an organizational priority. Based on the established and published goals of the organization, the leadership in the Department of Critical Care Nursing decided that the topic of mobility did fit into these established organizational goals.

The quality committee then formed a task force of critical care registered nurses. The membership of the team included RN's from all of the ICU's and PCU's as well as nurse managers and the director of critical care nursing. The Chair of the task force was a critical care Clinical Nurse Specialist. Many members of the task force are experienced critical care nurses. Several lamented that they had noticed a change in the nursing care provided in their ICU's in the past several years. These changes included:

1. A trend toward total bed rest for ICU patients and away from out of bed activities

2. A noticeable increase in hospital-acquired and ICU-acquired pressure ulcers

3. A failure of staff registered nurses, especially those with less experience, to consider mobility or activity progression to be part of the nursing plan of care. Many did not even think of mobility as important to patients in an ICU.

Following the steps of the Iowa Model, the task force held multiple planning meetings. They determined that there was enough information in the literature to pilot a change in practice. The literature contained expert opinion, known pathophysiology, and randomized controlled trials. The task force decided that the outcome for this quality project would be twofold: the placement of all ICU and PCU patients on the mobility guideline upon admission to any of the units; and an increase in mobility interventions performed while patients were in the critical care units.

Guideline development occurred over several months, meeting with experts and champions from nursing, respiratory therapy, clinical nutrition, physical therapy, occupational therapy, pharmacy, medicine, hospital quality, and risk management. The guideline was reviewed and approved by all of the necessary quality committees at the academic medical center. The guideline final approval was completed in April 2008.

The task force members collected baseline data on the current state of mobility in the ICU's and PCU's in April and May 2008. Education on the guideline occurred in May 2008. Task force members along with nursing QI committee members completed education in time for the guideline to "go live" in June 2008. The Nursing QI committee decided that 3 ICU's and 2 PCU's in one of the hospitals of the

academic medical center would pilot the guideline. After the pilot in these 5 units, the plan was to implement the guideline in the other ICU's & PCU's that are part of the medical system.

After implementation, the next step in the Iowa Model is that of evaluating the process and outcomes. This research focuses on the evaluation stage of the guideline. See Appendix A for the Critical Care Mobility Guideline.

**Purpose:**

The purpose of this DNP project is to determine the utilization of this mobility guideline in two medical intensive care units in an academic medical center. This project focused on the medical ICU patients who were admitted to either the 8 Rhodes ICU or the 11 Rhodes ICU during the months of September, October, and November 2010. The specific diagnoses of all of the patients are unique, but all patients have acute medical problems.

**Significance to Nursing**:

The Critical Care Mobility Guideline was developed for use in all patients across all critical care units. The guideline was written so that the bedside RN makes an active decision regarding the patient's mobility for each 24 hour period. No patients are excluded due to diagnosis. The exclusion criteria are related to the physiological stability or instability of each individual patient at the time of the daily RN assessment or related to types of equipment and treatments that may be present. These types of equipment and treatments are considered invasive and have a high likelihood of making mobility unsafe for these patients. Some exclusion criteria are: hemodynamic instability, continuous renal replacement therapy, unstable cervical spine, or pulmonary instability. A physician's order is required to initiate the guideline, but daily use is an autonomous nursing decision. The utilization of the guideline is, therefore, solely at the discretion of the bedside RN and requires his/her commitment. These requirements include: complete a patient assessment; review the criteria for exclusion from mobility; and decision of patient-appropriate mobility level for the patient on the shift. After the mobility plan has been developed and patient consent is obtained, the bedside RN determines how the mobility interventions will be operationalized. The significance to nursing lies in the autonomy that the bedside RN is allowed by the

guideline. This autonomy allows the bedside RN to make a mobility decision based on his/ her assessment and developed plan of care.

**Project Objectives:**

The objective of the project is to determine if the medical intensive care patients are receiving mobility interventions as directed by the Critical Care Mobility Guideline on days 3, 5, & 7 of their medical ICU stay.

**Chapter 2:  Review of the literature**

**Theoretical Framework:**

The University of Iowa Model of Evidence Based Practice provides the framework for the development of the mobility guideline.   The steps of the model are included in Figure 1. The process is initiated by triggers (problem-focused or knowledge-focused).  The topic is then determined whether it is a priority for the organization.   Team formation occurs and critique and synthesis of the literature is conducted to determine if a sufficient research base exists.  When a research base exists, pilot testing is completed.  The pilot testing step includes:  identification of outcomes, baseline data collection; design of the evidence-based guideline;  pilot implementation; evaluation of the process and outcomes and modification of the guidelines where indicated (Melnyk & Fineout-Overholt, 2011).

**Hazards of Immobility:**

In the late 1960's and early 1970's many nursing researchers published articles detailing the hazards of immobility.   Olson and Thompson published a series of short articles in 1967 titled "The Hazards of Immobility."   This series of articles were a system-by-system review of the currently known changes that occur in pathophysiology when a patient remains immobile.   Olson and Thompson drew on the work of known physicians and biologists of this time period.

Downs expanded on the hazard of psychosocial equilibrium in her 1974 study on bed rest and cognitive disturbances.  Downs studied ninety (90) males and ninety (90) female native born adults aged 18-35.  Many of the female subjects were nursing students.  All subjects had no physical limitations,  were not taking drugs, and reported normal hearing and vision.  She used a two-room complex that was remote from student activity and street noise and was controlled for light, and temperature.  Subjects were told they were enrolled in a "bed rest study" and had to remain awake in their bed for 2 ¾ hours without talking.  Auditory and visual stimuli were provided asking the subjects to estimate the passage of time. At 5 intervals investigators entered the room to obtain the subject's pulses.  No verbal exchanges occurred.  Her results found that 20% of the subjects experienced sensory distortions.  Most subjects complained of being "exhausted, anxious, and tense" after their experience.  She concluded that social

isolation  potentates sensory disturbances.  Downs offered nursing  intervention  such as human contact and supportive  communication  as essential to nursing care for hospitalized  patients.  She listed the results of her study as support for the importance of consistent, supportive,  face to face nursing contacts for patients (Downs, 1974).

Marilyn  Rubin published  the most widely  cited article on these hazards in 1988.  She reviewed many of the changes in normal physiology  that were originally  cited by Olson and Thompson.  Rubin expanded and updated some of the information  from this early work including  new physiological information  on the effects of immobility  on a number of body systems.  These system changes were found in the patient's heart, lungs,  kidneys,  immunological  organs, and hormone-producing  organs (Rubin,  1988).

**Mobilization of the Critically Ill Patient:**

The literature  becomes silent on the topic of mobility  in critical illness  during  much of the 1980's' and 1990's.  Researchers focused on other areas of interest in critical care.  This along  with many other changes in the health care delivery system may have caused the critical care RN to abandon the practice of mobilizing  critically  ill  patients.  The standard of care related to mobility  became frequent turning  of patients.  Most RN's during  the 1980's-2000's provided turning  or repositioning  of patients every two hours as their mobility  interventions.

In 2002, Krishnagopalan, Johnson, Low, and Kaufman, performed an observational study to determine if every two hour turning  was completed in three mixed ICU's in Hawaii.  These researchers found that 97% of patients did not receive turning every two hours.  Further, they found that almost 50% of patients lay supine for 4-8 hours, and that 23% of patients were not repositioned  for more than 8 hours (Krishnagopalan,  Johnson,  Low, & Kaufman, 2002).

In 2007 there were two landmark studies published  that re-ignited  the issue of mobility  in critical illness.  Hopkins,  Spuhler,  & Thompsen (2007) published  an article on a facility that transformed the culture of their ICU to make mobility  a priority.  The Respiratory ICU (RICU) at Latter Day Saints Hospital in Salt Lake City,  Utah embarked on a seven year journey to improve  outcomes for respiratory

failure patients and decrease their costs. This article describes the new care model that was used to manage respiratory failure patients throughout their entire course of hospital treatment. The authors reviewed baseline data in their hospital and found that respiratory failure patients made up only 2.5% of the ICU admissions, but had an average length of stay of three weeks and used 53% of the hospitals ventilator days. In looking at outcomes, the researchers found that 40% of those patients who survived their ICU stay had not returned to work during the first year post ICU discharge. The clinical change team used a multi-disciplinary process care model with the goals of decreasing complications of critical illness such as decubitus ulcers, stress ulcers, inadequate nutrition, over sedation, deconditioning, prolonged immobility, infections, and sleep deprivation. They also hoped to decrease mechanical ventilator days for their patients. Elements of their new process care model included a care manager to coordinate care activities for the patient's entire hospital stay; a multi-disciplinary standard care process that guides the care for all RICU patients; orientation on in-hospital and longitudinal outcomes; interdisciplinary documentation; and interdisciplinary tools.. This article reviewed the challenges and barriers that they discovered along their clinical change process.

A companion article by Bailey et al. (2007) published the results of the Latter Day Saints RICU of the clinical change process. The focus of this study was the feasibility and safety of mobility in respiratory failure patients. Researchers used a mobility protocol and a team of health care workers to provide the mobility interventions. They used a dedicated mobility team that consisted of a nurse, a respiratory therapist, a physical therapist, and a critical care technician. This mobility team targeted three activities: sitting on the edge of the bed; sitting in a chair; and ambulating. The median ambulation distance in the 593 intubated patients in the study was 200 feet. The occurrence of adverse events during mobility sessions was one percent. This led the researchers to conclude that mobility in this critically ill population was safe. These adverse events did not increase cost or patient length of stay. During the seven-month study period, the mobility team provided 1449 mobility sessions. This led the researchers to conclude that mobility in this critically ill population was feasible.

Another companion article related to the work of the RICU in Utah was published by Thomsen, Snow, Rodriguez, and Hopkins in 2008.  In this work, the authors wanted to determine if transferring patients to an ICU environment where mobility was a priority would improve the functional outcomes for patients.  The primary endpoint of this study was ambulation prior to discharge from the RICU.  Patients who were transferred to the RICU from another ICU had a two-fold increase in ambulation, a two-fold decrease in sedation use, and an 88% rate of hospital discharge.  They also had a median ambulation distance of 200 feet at the time of RICU discharge.

In 2009, Hopkins and Spuhler published the early activity mobility protocol used by their RICU in Utah along with a discussion about specific modifiable factors that impede mobility for ICU patients. Decreasing or eliminating these barriers to mobility has been the most recent focus of mobility work in their institutions.  They focused on three modifiable barriers to mobility:  (a) administration of sedatives and narcotics, (b) delirium,  and (c) sleep deprivation.  These authors recommended strategies for combating all three of these barriers.  These barriers were echoed in articles by Bailey, Miller, and Clemmer (2009); Vincent & Norrenberg (2009); Trong, Fan, Brower, and Needham (2009); Rhochester (2009); Needham & Korupolu (2010); Salisbury, Merriweather, and Walsh (2010).

One of the common themes related to mobility in critical illness is the use of a team of health care workers to provide the mobility interventions.  Articles published by Bailey et al. (2007); Trong, Fan, Brower, and Needham (2009); Schweikert, et al. (2009); Salisbury, Merriweather, and Walsh (2010); Zanni et al. (2010); Pohlman et al. (2010); and Hodgin, Nordon-Craft, McFann, Mealer, and Moss (2009) all used some form of dedicated mobility team to provide mobility interventions to their patients.  One of the most frequently cited publications related to the team concept for mobility in critical illness is by Schweikert, et al. (2009).  His team at the University of Pennsylvania contained physical and occupational therapists, nurses, pharmacists, physicians, unlicensed assistive personnel, and respiratory therapists to provide therapy during daily periods of sedation interruption.  In the intervention group, patients were assigned to early exercise and mobilization during their periods of daily sedation interruption.  In the control group, patients were provided with daily sedation interruption with therapy as ordered by the

primary care team (usual care or unsynchronized therapy with sedation interruption). The primary endpoint of the study was the number of patients returning to independent functional status at hospital discharge. Functional independent status was defined as the ability to walk unassisted and perform six specific activities of daily living at discharge. The six activities of daily living were: (a) bathing, (b) dressing, (c) eating, (d) grooming, (e) transferring from the bed to the chair, and (f) using the toilet. Of the 104 patients in the study, 29 (59%) of the patients in the intervention group returned to functional status at hospital discharge, compared to only 19 (35%) of the patients in the usual care group. Secondary endpoints of the study included the number of hospital days with delirium, the number of ventilator free days in the first 28 days of the patient's hospital stay, and the length of the patient's stay in the ICU. These researchers found that patients who received the intervention had shorter duration of delirium and more ventilator free days. The length of ICU-associated delirium was half as long in patients in the intervention group despite no differences in sedation. Patients in the intervention group had a median of 2.4 more ventilation free days. There was no difference in the ICU or hospital length of stay. These researchers concluded that the early physical and occupational therapy in combination with daily sedation interruption was safe and well-tolerated by critically ill patients.

Many researchers have returned to the topic of neuromuscular weakness as a result of an ICU stay. When Olson and Thompson published a series of short articles in 1967 titled "The Hazards of Immobility, they listed the effects of immobility on motor function as a loss of the daily mechanical stress on the skeletal muscles. More recent authors use terms such as "critical illness polyneuropathy and critical illness myopathy" (Vincent & Norrenberg, 2009, p. S296). A more general term has emerged in the past ten years, "ICU acquired weakness" (Vincent & Nuremberg, 2009, p. S296). ICU acquired weakness (ICUAW) is defined as, "weakness developing in a critically ill patient without an identifiable cause other than non-specific inflammation" (Vincent & Norrenberg, 2009, p. S296). The body is 45% muscle tissue (Topp, Ditmyer, King, Doherty, & Hornyak, 2002). When skeletal muscles are not used, they respond by atrophying causing a loss in contractility and strength (Topp et al, 2002). During periods of inactivity, skeletal muscle strength decreases by 1-1.5% per day with an escalating decline of 40%

muscle strength during the first week (Topp et al, 2002).  Several studies have looked at the subject of ICUAW.

In 2003, Herridge and colleagues worked in collaboration with the Toronto ARDS (acute respiratory distress syndrome) Outcomes Group to describe the pulmonary, functional, and quality of life outcomes of ARDS survivors.  These researchers followed patients for five years after their hospitalization for ARDS.  Three-month post-ICU discharge, most patients continued to report weakness especially in their shoulders and hips.  Information provided at 1-year and 2-year follow-up interviews echoed the weakness that the patients reported at 3 months.  By the 5-year follow-up, more than half of the patients continued to report weakness.  5-year ARDS survivors were only able to walk 76% of the distance of their age-and sex-matched peers (Herridge, et al., 2003).

DeJonghe, Lacherade, Sharshar, and Outin (2009) discuss risk factors and prevention of ICUAW. They report muscle weakness in 35-60% of patients who receive more than 1 week of mechanical ventilation.  They used standard electrophysiological testing to demonstrate changes in muscular structure and function such as membrane inexcitability and axonal involvement in patients with ICUAW.  These authors list five central risk factors for ICUAW: (a) multiple organ failure, (b) muscle immobilization, (c) hyperglycemia, (d) corticosteroids, and (e) neuromuscular blocking medications.  They discuss each risk factor in detail and conclude that, "avoiding unnecessary deep sedation and excessive glucose levels, promoting early mobilization, and carefully weighing the risks and benefits of corticosteroids….might contribute to reduce the incidence and severity of ICUAW" (deJonghe, Lacherade, Sharshar, and Outin , 2009, p. S313).

Griffiths and Hall report the results of The Brussels Round Table Conference 2009 in their article (Girffiths & Hall, 2010) related to ICUAW.  The attendees at this conference included "clinicians, physician scientists, and basic investigators" p. 779).  The participants at the conference concluded that ICUAW is a significant problem in patients' post-mechanical ventilation, that many patients suffer long-term disability related to ICUAW, and that more research is necessary.

Most recently, researchers at Wake Forest University looked at the link between ICU mobility and hospital readmissions (Morris et al, 2011). The purpose of their study was to "determine if index medical variables and early mobility are ultimately associated with readmissions or death in acute respiratory failure survivors" (p. 1). Using a population of 280 survivors of acute respiratory failure who all required mechanical ventilation during their stay in the ICU, the researchers followed patients for 12 months after their initial hospital admission (index admission). They found that "tracheostomy, female gender, higher Charleston Comorbidity Index, and lack of early ICU mobility were associated with readmissions or death during the first year" (p. 4). Patients who had early ICU mobility (as demonstrated by 4 more days out of bed during the index hospitalization) had fewer hospital readmissions or death. The researchers concluded that, "lack of early ICU mobility [was] a predictor of hospital readmission or death" (p.2).

**Chapter 3 Methodology**

**Research Design:**

A quantitative descriptive research design using retrospective medical record review was used to examine the utilization of mobility measures as recommended in the Mobility Guideline. Each medical record was reviewed at three points in time during the patient's stay in the ICU: once on day 3; once on day 5; and finally on day 7. Day number one was identified as the day the patient was admitted to the ICU. Days 3, 5, and 7 were chosen for the researcher to review changes in patient care over time. Patients admitted to the ICU's are most unstable on the day of admission. Completion of mobility interventions at this time may not be appropriate for all patients and documentation should reflect this. By days 3, 5, and 7 medical and nursing interventions have been utilized. There is no information in the literature defining the optimum time for mobility interventions. This study will describe the current practice in two medical ICU's at an academic medical center.

**Sample:**

The study sample included all medical intensive care unit patients who were admitted to one of two medical intensive care units of a large Midwestern academic medical center during the months of September, October, and November 2010 and who met inclusion criteria. Patients had to remain in one of these medical ICU's until at least day 3. The study excluded patients who were less than 18 years of age, pregnant women, and/or prisoners.

The medical ICU's use the new Simplified Acute Physiology Score (SAPS II) to determine the severity of illness of patients admitted to the units. A maximum SAPS II score is 163. The SAPS II score was developed in 1993 to provide a method to convert the severity of illness scores of patients into a probability of hospital mortality (LeGall, Lemshow, & Saulnier, 1993). This score evaluated more than 13,000 medical and surgical ICU patients in 12 countries in Europe and North America (LeGall, et al., 1993). These researchers evaluated physiology variables and recorded the worst value of the variable during the first 24 hours of the patient's stay in the ICU (LeGall, et al., 1993). The team then calculated a SAPS II score using 17 variables. Of these 17 variables, 12 were physiologic and 5 were not. The SAPS

II variables are listed in Table 1.  After the SAPS II scores were calculated, they converted the SAPS II

score into a probability  of hospital mortality  using a logistic  regression equation  (LeGall, et al., 1993).

The performance of the SAPS II is best when used as an aggregate of risk.  It does not predict the

mortality  of individual  patients, "only that a percentage of patients with the same probability  are likely  to

die" (LeGall,  et al., 1993).

In clinical  practice,  the SAPS II scores are collected on each patient using  the worst value of the

17 variables  during the first 24 hours of their ICU stay.  The data is used to benchmark the severity of the

types of patients who are admitted to an ICU; so that, patients with higher SAPS II scores have a higher  in

hospital mortality.  Clinicians  use SAPS II data to demonstrate that the patients they care for are critically

ill  and as an indicator of mortality.

Table 1:  Simplified  Acute Physiology  Score (SAPS II) Variables_____

- Age
- Heart rate
- Systolic  blood  pressure
- Body temperature
- $PaO_2/FiO_2$ ratio (ratio of the patients partial pressure of arterial oxygen to the fraction of inspired oxygen)
- Urinary output
- Serum urea or serum urea nitrogen  level
- White blood  cell count
- Serum potassium  level
- Serum sodium  level
- Serum bicarbonate level
- Bilirubin  level
- Glasgow Coma Score
- Type of admission (unscheduled surgical, scheduled surgical, or medical)
- Acquired Immune  Deficiency Syndrome
- Hematologic  malignancy
- Metastatic cancer

_____

**Methods:**

Retrospective medical record data was collected on all sample subjects to determine whether or

not the patient received mobility  interventions  on day 3, day 5, or day 7 of his/her medical ICU stay.  The

data collection tool was developed by the researcher.  It has not been used in previous data collection

endeavors and has not been tested for validity or reliability. Only one researcher (who is an expert in clinical documentation and was familiar with the medical record) completed the data collection (MLD). The medical records review was the complete medical record of each patient as it stood on the day of the documentation review. The institution uses a combination of electronic and paper documentation systems. The nursing staff documents using an electronic medical record called Essentris (Clinicomp, Inc., Los Angles, CA). The medical staff uses a combination of Essentris documentation and hospital specific paper forms. Ancillary consultants such as physical therapy and occupational therapy use hospital specific paper forms. Information regarding the date, time, and location of the admissions to each of the ICU units was found in the hospital database known as E results. The Admission/ Discharge/ Transfer functions of the E results system allowed the researcher to obtain the names and medical record numbers of all patients admitted to these ICU's during the study period.

**Instrument:**

The data collection tool (Appendix B) was developed by the researcher. Content analysis was conducted using a group of critical care registered nurses, advanced practice nurses, and physicians familiar with the project who offered review and editorial changes. All of the tool reviewers were familiar with the Critical Care Mobility Guideline and the current literature related to mobility in the intensive care unit. Data collection was completed and recorded on this newly developed data collection tool. This tool required the collector to transcribe the information on the electronic or paper form onto the collection tool. This tool contained data points such as age range, gender, height, weight, and SAPS II score along with questions regarding the number and type of mobility interventions performed. The Critical Care Mobility Guideline (Appendix A) contains specific exclusion criteria (criteria that exclude patients with certain conditions, diagnoses, and equipment from mobility interventions). Information regarding the presence and type of patient exclusions to mobility was collected.

**Data Analysis:**

The data obtained were analyzed using the descriptive techniques. All data were assessed throughout data collection in an attempt to avoid missing data. At each data point, sample size was

recalculated to account for the reduction in sample due to discharge from the ICU. Correlations using Spearman's Rho were conducted to examine relationships between use of mobility interventions (yes/no) and severity of illness as measured by the SAPS II score.

## Chapter 4: Findings

**Description of Sample:**

The 11 Rhodes ICU is a 25-bed medical ICU.  8 Rhodes ICU is a 13-bed medical ICU.  Patients who meet the admission criteria for an ICU bed are admitted to either unit per the triage process of the medical center.  The only preference in unit assignment is related to those needing negative airflow. Those patients must be assigned to 11 Rhodes ICU as it is the only unit with room environment capability for negative airflow.  Patients are triaged and admitted on a rotational basis based on bed availability. There is no difference in severity of illness of the patients who are admitted to either medical ICU. Therefore, the patient sample from each unit is considered equal (except in actual number of participants). The final sample contained 124 patients from the 11 Rhodes ICU and 83 patients from the 8 Rhodes ICU for a total of 207 patients for the day 3 inclusion.  The total sample contained 118 males and 89 females. See Table 2 for a description of the sample.

Table 2:  Description  of the Sample  (N=207)

| | Overall | | 8 ICU | | MICU | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Total number of participants | 207 | (100%) | 83 | (40.1%) | 124 | (59.9%) |
| | | | | | | |
| On Day 3 | 207 | (100%) | 83 | (100%*) | 124 | (100%*) |
| On Day 5 | 140 | (67.6%) | 58 | (69.8%*) | 82 | (66%*) |
| On Day 7 | 104 | (50.3%) | 43 | (51.8%*) | 61 | (49%*) |
| | | | | | | |
| Gender | | | | | | |
| Male | 118 | (57%) | 57 | (69%*) | 61 | (49.9%*) |
| Female | 89 | (43%) | 26 | (31%*) | 63 | (50.1%*) |
| | | | | | | |
| Age Range in Years | | | | | | |
| 18-30 | 8 | (3.8%) | | | | |
| 31-40 | 22 | (10.6%) | | | | |
| 41-50 | 25 | (12.1%) | | | | |
| 51-60 | 67 | (32.3%) | | | | |
| 61-70 | 38 | (18.3%) | | | | |
| 71-80 | 22 | (10.6%) | | | | |
| > 80 | 25 | (12.1%) | | | | |

ICU = Intensive  Care Unit;  MICU = Medical  intensive  care unit ; * = unit-specific  percentage

Age ranges were used to describe patient chronological age.  The ages ranges were in decades: 18-30, 31-40, 41-50, 51-60, 61-70, 71-80, > 80.  The 51-60 age range contributed 32.4% of the overall sample, the largest contribution of all the age ranges.  The SAPS II score across the sample ranged from 9 to 140.  The mean SAPS II was 62.734 $\pm$ 23.46.  No differences were seen in SAPS II scores between ICU units.

**Exclusion from Mobility Interventions:**

*Day 3*

There were 207 patients who were part of the sample on day 3.  Of those patients, 76 met exclusion criteria for mobility and 131 were eligible for mobility.  Some patients displayed more than one exclusion criteria to mobility during each day of the data collection period (See Table 3).  For these patients, all exclusion criteria were recorded.  This is the reason that there may be more exclusion criteria recorded than number of patients in the sample.  The most common exclusion criterion for patients on day 3 was hemodynamic instability.  Forty-six (60.5%) of the patients met this criterion. (See Table 3)

*Day 5*

There were 140 patients from the original sample who remained in the 11 Rhodes ICU or the 8 Rhodes ICU on day 5.  Of these 140 patients, 59 patients had exclusion criteria for mobility on day 5 (See Table 3).  Again, hemodynamic instability was the most frequent exclusion criterion as it was recorded in 32 of the 59 patients (54.2%).

*Day 7*

From the original sample of 207 patients, there were 104 patients who remained in the medical ICU's on day 7.  Of these 104 patients, 42 had exclusion criteria to mobility on day 7. As with all of the other time periods, hemodynamic instability accounted for most of the mobility exclusions (23 /42=54.7%).   (See Table 3).

Table 3: Exclusion Criteria

|  | Day 3 N % | Day 5 N % | Day 7 N % |
|---|---|---|---|
| Total N | 207 | 140 | 104 |
|  |  |  |  |
| Any exclusion criteria? |  |  |  |
| Yes | 76 (36.7%) | 59 (42.1%) | 42 (40.3%) |
| No | 131 (63.3%) | 81 (57.8%) | 62 (59.7%) |
|  |  |  |  |
| Specific Exclusion Criteria* |  |  |  |
| Hemodynamic instability | 46 (60.5%) | 32 (54.2%) | 23 (54.7%) |
| CRRT | 18 (23.6%) | 18 (30.5%) | 17 (40.4%) |
| RASS | 15 (19.7%) | 16 (27.1%) | 14 (33.3%) |
| Pulmonary instability | 13 (17.1%) | 15 (25.4%) | 6 (14.2%) |
| Terminal weaning/ withdrawal of care | 6 (7.8%) | 0 | 2 (4.7%) |
| All others | 3 (3.9%) | 1 (1.6%) | 2 (4.7%) |

CRRT = continuous renal replacement therapy; RASS = Richmond Agitation Sedation Scale; * participant can have more than one time for intervention, i.e., each day % total is > 100%.

**Mobility on day 3:**

There were 131 were eligible for mobility one day 3 and 39 (29.7%) received at least one mobility intervention and 14 patients in this group received more than one mobility intervention. The most frequent mobility intervention on day 3 was up to the bedside chair with 24 of the 39 (61.5%) patients receiving this type of mobility. (See Figure 2). The time of the day during which the mobility interventions occurred was also recorded. Most of the mobility occurred during the morning time period. Morning was defined as 0600-1200. During the morning period, 24 of the 39 patients (61.5%) received their intervention. The second most common time of day for mobility interventions was the afternoon time period which was defined at 1201-1700. During the afternoon period, 17 of the 39 (43.5%) patients received their intervention. The body mass index (BMI) is a measure of body fat based on height and weight for adult men and women (U. S. Department of Health and Human Services, 2011). This value is categorized to determine if the adult is underweight, normal weight, overweight, or obese. The range of BMI values for the patients who received mobility on day 3 was 17.3-71.1. The mean BMI for the mobility patients was 28.5. A summary of the data collected for day 3 is located in table 4.

**Mobility on day 5:**

There were 140 patients from the original sample who remained in the 11 Rhodes ICU or the 8 Rhodes ICU on day 5.  Of this sample, 26 patients received mobility  on day 5 (32.1%).  The most frequent mobility  intervention  on day 5 was up to the bedside chair (See Figure 3).  Of those patients  who received mobility,  11 were up to the chair (42.3%).  The timing  of the mobility  interventions  on day 5 also showed that most patients received mobility  between the hours of 0600 and 1700.  Fifty-six  percent of mobility  interventions  occurred during the morning  time period and eleven percent during  the afternoon period.  The range of BMI values for those in the mobility  group was 19.1-92.2 with a mean BMI of 31.5.  A summary of the data collected for day 5 is shown in table 4.

**Mobility on day 7:**

From the original sample of 207 patients, there were 104 patients who remained in the medical ICU's on day 7.  Of these 104 patients, 27 received mobility  interventions.  As with all of the other time periods, hemodynamic instability  accounted for most of the mobility  exclusions (23 /42=54.7%).  Day 7's data continued to demonstrate the same characteristics as on the previous data collection  days.  The most frequent mobility  intervention  was out of bed to the chair (12/27=44.4%), and the most frequent time  of day was the morning  (19/27=70.3%).  The range of BMI values for the mobility  patients was 19.1-63.9 with a mean BMI of 30.1.  A summary of the data collected for day 7 is shown in table 4.

Table 4: Mobility Intervention Use

| | Day 3 | | Day 5 | | Day 7 | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Total N | 207 | | 140 | | 104 | |
| Eligible for mobility intervention | 131 (63.3%) | | 81 (57.9%) | | 62 (59.6%) | |
| Received mobility intervention | 39 (29.7) | | 26 (32.1%) | | 27 (43.5%) | |
|    BMI Range | 17.3-71.1 | | 19.2-92.2 | | 19.1-63.9 | |
|    BMI Mean | 28.5 | | 31.5 | | 30.1 | |
|    BMI categories | | | | | | |
|       Underweight (<18.5) | 2 | | 0 | | 0 | |
|       Normal (18.5-24.9) | 17 | | 8 | | 7 | |
|       Overweight (25-29.9) | 8 | | 9 | | 9 | |
|       Obese ($\geq$ 30) | 12 | | 9 | | 11 | |
| Time of day for mobility intervention* | | | | | | |
|    Morning (0600-1200) | 24 (61.5%) | | 15 (57.6%) | | 19 (70.3%) | |
|    Afternoon (1201-1700) | 17 (43.5%) | | 11 (42.3%) | | 6 (22.2%) | |
|    Evening (1701-2200) | 7 (19.7%) | | 5 (19.2%) | | 6 (22.2%) | |
|    Night (2201-0559) | 3 (1.1%) | | 4 (15.3%) | | 3 (1.1%) | |

BMI = Body mass index (kg/m2); * participant can have more than one time for intervention, i.e., each day % total is > 100%.

**SAPS II Score Impact on Mobility**

Spearman's rho correlations did not reveal any relationships between SAPS II score and the presence or absence of mobility interventions. Minor negative, non-significant correlations were noted in the direction expected: the higher the SAPS II score the less mobility interventions were employed. Spearman's rho were used to assess for relationships between dichotomous variables (mobility intervention yes/no) and interval variables (SAPS II Scores). See Table 5 for Spearman's correlations.

Table 5:
Spearman's Rho Correlations Between SAPS II Score and Use of Mobility Interventions

|  | SAPS II | Day 3 | Day 5 | Day 7 |
|---|---|---|---|---|
| **SAPS II Score** |  |  |  |  |
| N | 203 | 203 | 138 | 100 |
| Correlation | 1.0 | -.019 | -.004 | -.022 |
| Significance |  | .784 | .963 | .829 |
|  |  |  |  |  |
| **Day 3** |  |  |  |  |
| N |  | 207 | 141 | 103 |
| Correlation |  | 1.0 | .217 | .039 |
| Significance |  |  | .010* | .693 |
|  |  |  |  |  |
| **Day 5** |  |  |  |  |
| N |  |  | 141 | 102 |
| Correlation |  |  | 1.0 | .190 |
| Significance |  |  |  | .056 |
|  |  |  |  |  |
| **Day 7** |  |  |  |  |
| N |  |  |  | 103 |
| Correlation |  |  |  | 1.0 |
| Significance |  |  |  |  |

SAPS II Score = Simplified Acute Physiology Score II

**Discussion:**

The Critical Care Mobility Guideline has been considered the standard of care in the 11 Rhodes ICU and the 8 Rhodes ICU for more than 2 years. A review of the data collected during this project, demonstrates that less than half of the medical ICU patients are receiving mobility interventions per the guideline. Only two patients received mobility on all 3 days. There were six patients who received mobility on days 3 and 5; and seven patients who received mobility on days 5 and 7. There were four patients who received mobility on days 3 and 7. There are several ways to interpret this finding. One, if it were a question of the bedside RN becoming familiar with the plan of care for an individual patient, then the researchers would expect to see and increase in mobility interventions as the patient's length of stay in the ICU increases. This was not demonstrated as a length of stay of 7 days did not increase whether or not a given patient received mobility interventions. A second interpretation of this finding is

that those patients who remained in the ICU on day 7 were more severely ill than those who had a shorter length of stay. This is not true as the SAPS II scores for the patients who received mobility ranged from 9-140. Also, discharge disposition from the ICU was not recorded. Many of the patients who were not part of the samples on day 5 or day 7 could have expired and were therefore, discharged from the ICU.

There was no relationship between the utilization of the mobility guideline and the BMI of the individual patient. The BMI's of patients who received mobility displayed a wide range of values (17.3-92.2).

The most common mobility intervention for each reviewed day was up to the bedside chair. The number of patients who received the intervention of range of motion (ROM) was six of thirty-nine on day 3 (15.3%). This percentage increased to ten of twenty-seven (37%) by day 7. There is no way to interpret this increase of ROM based on the data collected. It may be a result of the commitment to mobility of the individual RN who was assigned to the patient. It may be related to the acuity of the patient's condition on day 7.

Most patients who received mobility interventions had these interventions performed during the morning and afternoon time periods. This may signal an effort on the part of the bedside staff to provide "usually daily activities" during day time hours. It may be that most patients consent to mobility during these time periods. It may signal that the staff who work during these shifts have a stronger commitment to providing mobility. As mentioned in the literature review, early mobility is hypothesized to decrease delirium. One of the non-pharmacologic interventions used to prevent and treat delirium is mobility.

Despite the variety of medical diagnoses that required a patient's admission to these medical ICU's, the exclusion criteria were similar. The most common criterion for exclusion was hemodynamic instability. This criterion was written very broadly to allow room for interpretation by the bedside RN. There are no specific values for variables such as heart rate, respiratory rate, or blood pressure. It relies on the bedside RN's assessment of the patient's hemodynamic status and is, therefore, individualized for each patient. One patient may be determined to be "hemodynamically unstable" by a bedside RN because his heart rate is 110 beats/minute. Another RN may consider this value of 110 beats/minute to be a

baseline value for the patient and, therefore, not an unstable value. The second RN may have performed a mobility intervention when the first RN did not. The researchers did not evaluate the bedside RN's decision for including or excluding a patient based on the guideline's exclusion criteria.

In reviewing the literature, there were similarities and differences between the mobility work done by researchers in Utah (Bailey, Hopkins, Spuhler, & Thompsen); Baltimore (Zanni et al and Needham); Illinois (Schweikert, et al.); North Carolina (Morris et al,); and Ohio (OSUMC). One of the similarities is that all of the mobility studies were completed in medical ICU patients except for the Utah group. This group used respiratory failure patients who were located in a respiratory ICU. In the other hospitals in the group, these respiratory failure patients would, most likely, be placed in medical ICU units. Another similarity is that five out of the six institutions were university medical centers. Five out of the six institutions also used designated mobility teams to complete the mobility interventions. One difference was in the composition of the mobility teams. In the Utah and Illinois group, the teams consisted of an RN, a physical therapist (PT), a respiratory therapist (RT) and a technician. The North Carolina group used three of these members (without the RT). The Baltimore group did not include the bedside RN in the mobility and all interventions were completed by a PT, an occupational therapist (OT), and a patient care technician. The Ohio group did not employ a mobility team. All interventions for the Ohio patients were completed by the bedside clinical staff during their daily care of the patient. The focus of the project in five of the six institutions was quality improvement. Only the Utah group did their project as a clinical change project. Table 6 displays this data.

Table 6

Comparison of mobility studies

|  | Type of hospital | Patient population | Type of project | Use of a mobility team | Members of the mobility team |
|---|---|---|---|---|---|
| **Utah** | Community | RICU | Clinical change | yes | RN, PT, RT, tech |
| **Baltimore** | University medical center | MICU | Quality improvement | yes | PT, OT, tech |
| **Illinois** | University medical center | MICU | Quality improvement | yes | RN, PT, RT, tech |
| **North Carolina** | University medical center | MICU | Quality improvement | yes | RN, PT, tech |
| **Ohio** | University medical center | MICU | Quality improvement | no | Unit staff |

**Conclusions:**

The utilization of the mobility guideline in medical ICU patients is not as widespread as the researchers hoped. For ICU days 3, 5, 7, less than 50% of the patients without exclusion criteria received mobility interventions. Factors such as day of ICU stay, BMI, and SAPS II score did not affect whether of not a patient received mobility. The number or type of mobility interventions based on location (11 Rhodes ICU or 8 Rhodes ICU) was not reviewed. The researchers made a decision to review the utilization of the mobility guideline in the medical ICU's as a whole and not for any individual ICU unit.

The most common exclusion criterion for mobility was hemodynamic instability. The most common mobility intervention was up to the bedside chair.

These researchers conclude that the staffs in these medical ICU's are not utilizing the Critical Care Mobility Guideline as written.

## Chapter 5: Implications for Practice

**Summary:**

Many patients received mobility during their stay in the medical ICU's in an academic medical center. The mobility interventions that a patient received did not differ between the two medical ICU's. Only 2 patients received mobility at all three time periods. Most common mobility intervention was up to bedside chair. Most common exclusion criterion was hemodynamic instability. Most mobility interventions occurred during the morning time period (0600-1200).

**Limitations:**

There are several limitations in this study. One limitation is that data was collected for only medical ICU patients at an academic medical center in the Midwest. This study was not intended to provide information that would be generalizeable to other patient populations or intensive care units.

Another limitation is that this study relied on the medical record for information. The medical record can have missing data. It is not always a complete reflection of the care that the patient received. There are clinicians who fail to document care that they provided as well as clinicians who document interventions that they did not provide. Without completing actual observations of the mobility interventions, it is impossible to determine whether or not the patients received the interventions that were documented.

Another limitation related to a medical record review is that the researcher has no way of knowing why mobility interventions were not completed on eligible subjects. The medical record gives no indication of unit variables such as adequate nurse/ patient ratios, business of the unit on the given days of review, willingness of the staff RN to perform mobility, or refusal of mobility interventions by the patient.

This study did not record information on complications that occurred as a result of mobility interventions. There is no information on problems or negative events related to the mobility interventions that each patient received.

Finally,  the study did not collect the names of individual care providers.  It is possible  that the patients who received mobility  were all assigned to bedside RN's who are advocates of mobility  for patients during their stay in the medical ICU.  Further study is needed to determine the connection between the individual care provider and the mobility  interventions  provided  to his/her patients.

**Implications for practice/next steps:**

This initial  review of the utilization  of the Critical Care Mobility  Guideline  demonstrated that the guideline  is not being  followed 100% of the time.  There are patients who are eligible  for mobility  who are not receiving interventions.  This lack of use can signal an educational need by the unit staff, an unwillingness  to utilize  an approved guideline,  or a lack of resources to provide mobility  interventions.  There is a culture change related to mobility  that needs to take place on both the 11 Rhodes ICU and the 8 Rhodes ICU.  This culture change needs to include  a change in personal perceptions of the staff and the work habits of all of the team members.  All team members who work on these ICU units  need to recognize that early mobility  is necessary to improve  patient outcomes.  There are many barriers that exist when making  the culture change to early mobility.   Some of these barriers include: (a) physical structure of the patient rooms, (b) patient/ staff ratios, (c) availability  of necessary equipment, (d) fragmentation  of care, and (e) biases and resistance by the health care team.

Next steps may include  challenging  the staffs on both units  to focus on early mobility  and then collecting  repeat data.  Another study that identifies  the challenges that the members of the health care team face in performing  early mobility  with critically  ill  patients.  Also, previous studies in the literature have deemed the practice of early mobility  safe for ICU patients, but this has not been validated in the 11 Rhodes ICU and the 8 Rhodes ICU.  A study on safety in these specific units  with the medical ICU population  may move the culture of early mobility  forward at the academic medical center.

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Tables

Figures

Appendices

# Figure 1: Iowa Model of Evidence-Based Practice

**Problem-Focused Triggers**
1. Risk-management data
2. Process improvement data
3. Internal/external benchmarking data
4. Financial Data
5. Identification of clinical problem

**Knowledge-Focused Triggers**
1. New research or other literature
2. National agencies or organizational standards and guidelines
3. Philosophies of care
4. Questions from institutional standards committee

Is this topic a priority for the organization?

Consider other triggers

No

Yes

Form a team

Assemble relevant research and related literature

Critique and synthesize research for use in practice

Yes

No

Is there a sufficient research base?

Pilot the change in practice
1. Select outcomes to be achieved
2. Collect baseline data
3. Design EBP guideline(s)
4. Implement EBP on pilot units
5. Evaluate process and outcomes
6. Modify the practice guidelines

Base practice on other types of evidence:
1. Case reports
2. Expert opinion
3. Scientific principles
4. Theory

Conduct research

Is change appropriate for adoption in practice?

Yes

Institute the change in practice

No

Continue to evaluate quality of care and new knowledge

Monitor and analyze structure, process, and outcome data
• Environment
• Staff
• Cost
• Patient and family

Disseminate results

# Figure 2: Mobility Interventions

## Day 3 (N=39)

**Intervention**



Legend:
- Chair
- ROM
- Dangle
- Ambulate
- Stand

N=24 (Chair)
N=6 (ROM)
N=5 (Dangle)
N=4 (Ambulate)

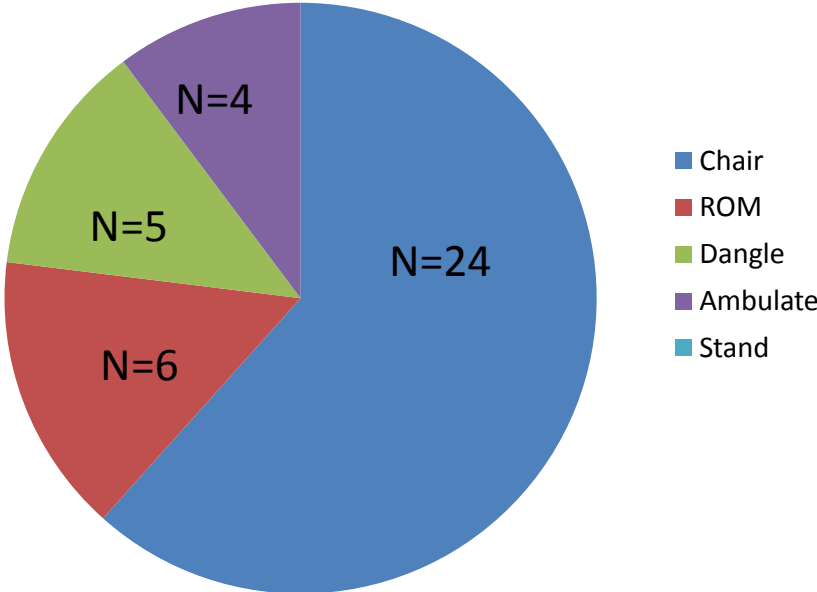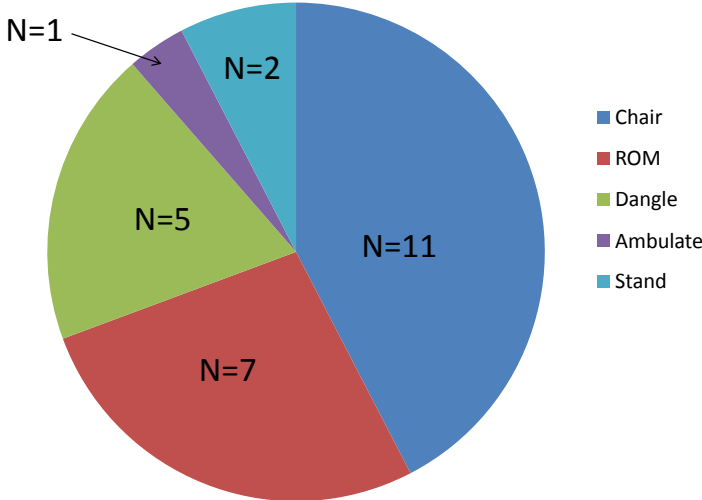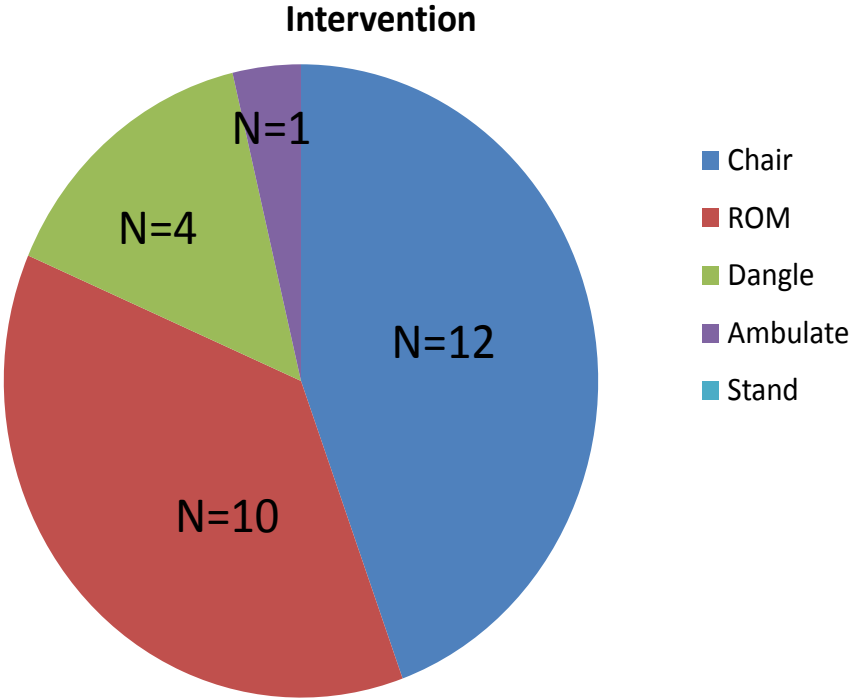# Figure 3: Mobility Interventions
## Day 5 (N=26)

# Figure 4: Mobility Interventions
## Day 7 (N = 27)

**Intervention**

APPENDIX A
The Ohio State University
Critical Care Mobility Guideline

## The Ohio State University Medical Center
## CRITICAL CARE MOBILITY GUIDELINE

**ASSESSMENT**
Can the patient participate in ROM activities?

**YES** → Active ROM BID

**NO** → Passive ROM BID (Reassess Q 24 hours)

Does the patient have any of the following exclusion criteria?
1. Hemodynamic instability
2. Pulmonary instability
3. PEEP > 10
4. ICP monitoring catheter
5. RASS < -2
6. CRRT
7. Femoral venous or arterial line
8. IABP
9. Cervical spine / spinal injury
10. Orthopaedic injury

**YES** → Bedrest, continue AROM (Consider PT consult for Therabands)

**NO** → Tolerated Dangle (Consider PT consult)

**YES** → Is patient able to extend knee and bear weight to a standing transfer to chair?

**NO** → AROM (Cadillac Chair, TCC)

**YES** → Standing transfer to chair Q day progressing to TID

**NO** → AROM (Cadillac Chair, TCC)

Tolerating chair TID?

**YES** → Progress to ambulation Q Day 10 feet and increase as tolerated

**NO** → Progress (use chair as tolerated)

Appendix  B
Data Collection  Tool

## Appendix B Data Collection Tool
## Day 3

Purpose: To describe the use of the Critical Care Mobility Guideline in the medical ICU's.

# Day of MICU/ 8 ICU stay 3

Random Study Number_____

Day of the week_____

Demographics:
  Sex          M          F

 Age range (circle one): 18-30; 31-40; 41-50; 51-60; 61-70; 71-80; > 80

  Severity of illness score:_____

  Isolation          Y          N

  Height _____cm

  Weight_____kg

1. Did this pt. have any of the exclusion criteria in the mobility guideline on day 3 of his/her stay?          Y                    N

  If Yes, which one(s)  _____

2. Was mobility preformed on day 3?          Y                    N

3. List type and number of mobility interventions
  _____

  _____

  _____

4. Approximately what time of day did the mobility sessions occur?

  Morning (0600-1200)_____

  Afternoon (1201-1700)_____

  Evening (1701-2200)_____

  Night (2201-0559)_____

  Note: Day of admission to the medical ICU's is day 1.