

The Effect of an Early Mobility Protocol among Critically Ill Patients

by

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### **Abstract**

Healthcare organizations are under increasing pressure to provide the best care for their patients. They are not only starting to be held accountable for preventable problems, but are being scrutinized based on patient outcomes. Many patients in the hospital will require a stay in the intensive care unit (ICU). While many patients do survive their ICU stay, a large number of them are left with physical disabilities related to that stay. Some of those disabilities are long term or even permanent. Research has shown early mobility to be beneficial to ICU patients, and helps to prevent or alleviate some of the problems associated with an ICU stay. A multidisciplinary team was formed to implement early mobility at a large metropolitan hospital in Southern California. A policy was developed and the ICU staff was educated on early mobility. Early mobility was implemented in 2012. Since the implementation of early mobility in this ICU, data has shown a decrease in ventilator time, ventilator associated pneumonia rates and mortality rates. The purpose of this performance improvement project was to evaluate the effects of an early mobility protocol among critically ill patients in the intensive care unit upon ventilator time, ICU length of stay and hospital length of stay.

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## Chapter One

Patients that require a stay in the intensive care unit may present with many different illnesses, some of which will require mechanical ventilation. Between three to six percent of patients admitted to American intensive care units are on mechanical ventilation with a staggering 40% of these patients requiring it at some point in time during their intensive care unit (ICU) stay (Hopkins & Spuhler, 2009). Mechanically ventilated patients primarily are placed on bed rest due to their extreme acuity. The critically ill patients then begin to suffer the effects of immobility in addition to their original illness.

Immobility has demonstrated negative effects throughout the entire body (Dock, 1944). Deterioration of the muscles begins after six hours of bed rest and can cause a decrease in muscle strength by up to 40% in one week (Johnson, 2007). This muscle weakness can contribute to a longer weaning process from a mechanical ventilator (Bell, 2009). In healthy people, microvascular dysfunction and insulin resistance develop after as few as five days of bed rest (Fitzpatrick et al., 2010). Complete bed rest can cause an increase in the workload of the heart with a decrease in cardiac output (Fitzpatrick et al., 2010). It has also been shown to be a precursor for ventilator associated pneumonia (VAP) (Fitzpatrick et al., 2010). VAP is a hospital acquired pneumonia, which will soon be classified as a *never event* that hospitals will not be reimbursed for financially (Bailey, Miller, & Clemmer, 2009).

Multiple studies have shown that physical therapy on critically ill patients is usually minimal at best (Zanni & Needham, 2010). Only 11% of patients in the ICU are shown to have any activity other than bed rest (Hopkins & Spuhler, 2009). There are also a number of barriers to mobilizing ICU patients including sedation, safety concerns including patient stability, a lack of knowledge and the ICU staff culture (Zanni & Needham, 2010). However, studies have

shown that mobilizing patients in the ICU has many benefits, including a decreased length of stay, decreased ICU days and a decrease in the number of tracheostomies performed due to failure to wean (Morris et al., 2008). Early mobilization has also been shown not to increase costs and in some cases may save hospitals money (Morris et al., 2008). One day on mechanical ventilation is estimated on average to cost around \$1500 (Johnson, 2007). Unfortunately, not every ICU patient has insurance and reimbursement becomes an issue.

### **Significance of the Problem**

Complete bed rest is typically the standard activity order in the ICU. Nurses and staff caring for the patients may feel it is better for the patient to rest due to their critical illness (Bailey et al., 2009). However, bed rest may also increase recovery time (Hopkins & Spuhler, 2009). Mobilizing a ventilated patient may also be a very difficult task that requires multiple staff members. Necessary medical equipment may be a barrier to mobilizing ICU patients as well. While health care providers in the intensive care unit may have concerns, research has shown mobilizing ventilated patients to be safe (Morris et al., 2008).

Health care personnel work to help patients achieve their recovery goals. If the intervention will truly benefit the patient, most nurses will gladly perform such interventions, even if it is more work for them. By providing early mobility to appropriate patients, nurses are helping their patients reach their goals (Fitzpatrick et al., 2010).

### **Problem Statement**

There are increasing numbers of patients surviving their ICU stay (Needham et al., 2010). These patients are experiencing long term problems after their discharge from the ICU due to prolonged immobility (Hopkins & Spuhler, 2009). Studies have shown that about half of the patients who lived the ICU experience were unable to return to work one year after discharge due

to long term problems associated with immobility (Hopkins & Spuhler, 2009). Survivors of acute respiratory distress syndrome have been shown in studies to have substantial physical disabilities correlated with muscle wasting from bed rest in the ICU (Fitzpatrick et al., 2010). Nurses and care givers need to advocate for, and assist in providing early mobility to help their patients return to their baseline activity level. Unfortunately, while beneficial and safe, early mobility is not widely practiced (Bailey et al., 2009).

### **Purpose Statement**

An early mobility protocol at a large metropolitan level 1 trauma hospital in Southern California was developed. For purposes of this project, early mobility was defined as a series of sequential and progressive movements that starts at the patient's current activity level, with the aim of these movements being to return to the patient's baseline activity level (Fitzpatrick et al., 2010). The purpose of this performance improvement project was to evaluate the effects of an early mobility protocol among critically ill patients in the intensive care unit upon ventilator time, ICU length of stay and hospital length of stay.



## **Chapter Two**

### **Literature Review**

CINAHL, Ovid MEDLINE and Health source were used to conduct a comprehensive literature review. Key words and phrases included mobility, early mobility, progressive mobility, intensive care, critical care, mechanical ventilation, bed rest and Virginia Henderson theory were used. All articles used were featured in peer reviewed journals. All but one article was published after 2006. The article by Dock on bed rest that was published in 1944 was included due to its relevance as being the first article published to discuss the negative effects of bed rest. Many articles were found on studies done in hospitals where early mobility has been successful. Some of the barriers and benefits to early mobility are presented below, along with other relevant information on the practice of early mobility.

#### **Barrier of ICU Culture and Safety**

Many nurses and other staff members in the ICU may feel that their patient is too sick for early mobility, and that they will get better with rest (Hopkins & Spuhler, 2009). Some health care providers in the ICU may also feel that early mobility is not safe for their patients. Mechanically ventilated patients are on life sustaining equipment and some in the ICU may not feel that early mobility is worth the risk of tube or line dislodgement. Patients in the ICU may have continuous intravenous (IV) medications and mobility may put them at risk of having their IV line pulled out. ICU patients also need to be monitored at all times and therefore a portable monitor is needed. Portable monitors and ventilators are expensive pieces of equipment, and there may only be a small number to use (Fitzpatrick et al., 2010). The preceding can be perceived as more trouble than it's worth and may prevent mobility (Needham & Korupolu, 2010). However a study done at a respiratory intensive care unit demonstrated adverse events

from early mobility to be minimal at less than 1%, and when they did occur, they did not result in any severe harm to the patient, or extra costs to the hospital (Bailey et al., 2007).

Intensive care units have been shown in some studies to be lacking good if any multidisciplinary teamwork between nursing and rehabilitation therapy (Hopkins, Spuhler, & Thomsen, 2007). Early mobility requires a multidisciplinary approach with cooperation and coordination, especially from the nurse, physician, respiratory therapist, physical therapist and ICU technician (Zanni & Needham, 2010). An article by Hopkins et al. discussed how the authors transformed a respiratory intensive care unit (RICU) to promote early mobility. The unit consisted of mostly “new” nurses who could be fostered into the early mobility culture. Nurses, physical therapists and respiratory therapists were trained in certain tasks to help the others while they were busy mobilizing a patient, such as a nurse giving a respiratory treatment or a physical therapist disconnecting and flushing a feeding tube (Hopkins et al., 2007). Patients were also transferred into the RICU five to seven days sooner than prior to the unit transformation, where they could participate earlier with physical therapy (Hopkins et al., 2007). The particular unit featured in this article was shown to decrease the average hospital length of stay from 13 to 10 days (Hopkins et al., 2007). The number of tracheostomies performed due to failure to wean also decreased with the new RICU from 29% to less than 5% and weaning failure decreased from 12% to 3% (Hopkins et al., 2007). Costs to the patient and the hospital decreased as a direct result of the preceding (Hopkins et al., 2007).

### **Barrier of Sedation, Sleep Deprivation and Delirium**

Many mechanically ventilated patients in the ICU are sedated (Fitzpatrick et al., 2010). A study done by Hopkins and Spuhler (2009) showed that many ICU nurses may feel that the

experience of mechanical ventilation is uncomfortable which validates the use of sedation on their patients. A tool that may help prevent over sedation is the Richmond Agitation Sedation Scale (RASS) screening tool. This tool helps nurses to assess their patient's sedation level and titrate sedating medications accordingly (Needham & Korupolu, 2010). Levels of sedation according to the RASS tool are important to follow as patients need to be awake at a certain level to participate in early mobilization.

Sleep deprivation is an ever present problem in the intensive care unit. The ICU can be a very noisy place due to all the machines and their alarms. Patients are also awakened frequently for vital signs, positioning and other observations (Hopkins & Spuhler, 2009). Sleep deprivation puts patients at risk for developing delirium (Hopkins & Spuhler, 2009).

Patients who experience delirium are shown to have problems participating in early mobility. Delirium can affect any patient in the hospital. According to Balas et al., delirium is associated with many negative outcomes including increased costs, lengths of stay, disability rate and an increased risk for adverse events in the ICU (2012). The patients that have delirium also have a 41% higher chance of being discharged to a place other than home (Balas et al., 2012). Development of delirium has been shown to result in an increased mortality rate in patients (Needham & Korupolu, 2010). Delirium can be determined early with regular screening using the Confusion Assessment Method (CAM) tool, which will help in its supportive treatment (Needham & Korupolu, 2010). Health care providers in the ICU can also help overcome this barrier by encouraging the use of antipsychotics or other sedatives instead of benzodiazepines in patients with acute delirium. This is due to the fact that correlations have been shown between benzodiazepines and delirium (Needham & Korupolu, 2010). The preceding three issues are

some of the barriers to early mobility. If a patient is not able to cooperate, they cannot fully participate in early mobility.

### **Barrier of No Policy**

In order for early mobility to be effective and practiced on a regular basis, hospitals need to develop policies with guidelines for staff. The nurse needs to be educated to be able to properly screen patients prior to any early mobility activity, and only attempt such activity with appropriate patients. Patients need to be hemodynamically stable and meet certain safety criteria before participating in early mobility (Morris et al., 2008). The goal of early mobility is to return the patient to their baseline level of functioning (Morris et al., 2008). One study noted that therefore it is unrealistic to try to ambulate a patient that is chronically bedridden prior to their hospitalization as that is not what their prior level of functioning was (Morris et al., 2008). With the proper education and a sound policy in place, early mobility can become a reality.

### **Barrier of No Ownership**

The successful implementation of an early mobility protocol for patients depends on a multidisciplinary team approach. However another barrier is the question of what discipline needs to own the process of early mobility. While each member of that team plays an important role, the nurse needs to take ownership for the process of early mobilization (Bell, 2009). The nurse can do this mainly by identifying patients that are able to benefit from early mobility, and the nurse can advocate for orders to start early mobility. The nurse can also start the early mobility process without the help of physical therapy by turning, repositioning and passive range of motion ("Early Mobilization Recommended," 2012). They can advocate for their patients and ask physicians for an order for early mobility. The nurse needs to be a gateway of communication between the patient and physical therapy. The nurse does this by communicating

important information about their patient's overall condition and readiness for early mobility (Bell, 2009).

### **Benefit of Patient Satisfaction**

Early mobility has been shown to positively affect patient satisfaction (Fitzpatrick et al., 2010). Exercise has been shown to improve muscle strength, decrease fatigue and overall, make people happier (Fitzpatrick et al., 2010). An article by Dock discussed the benefits of exercise (early mobility) in soldiers wounded in World War II. He found that early ambulation improved overall health and morale, and that soldiers were able to return to war quicker (Dock, 1944). While the previously referred to article may have been published in 1944, it is supported by many articles including the one mentioned earlier in this paragraph.

A recent study published by a physical therapist treating critical care patients discussed the success of the early mobility practice in their facility. The author of said study noted that patients have a more positive outlook towards their medical condition when they improve their mobility (Perme & Chandrashekar, 2009). The patients themselves will notice this positive outlook, and feel that they are receiving optimal care. This outlook may positively affect patient satisfaction scores. For most patients, their ultimate goal is to go home and return to their normal level of functioning. This is also one of the many goals of the ICU. Through early mobility, health care providers in the ICU can help their patients to achieve that goal.

### **Benefit of Decreased Length of Stay and Costs**

Early mobility has been shown to decrease some of the negative effects of immobility (see chapter 1) (Fitzpatrick et al., 2010). A study by Morris et al. (2008) has shown that hospitals with an early mobility program have decreased their mean ventilator days by 1.1 days, mean ICU length of stay by 1.4 days and mean hospital length of stay by 3.3 days. This study

also demonstrated an overall decrease in average per patient cost from \$44,302 to \$41,142 (Morris et al., 2008). More recent studies found that patients who were able to benefit from early mobility had fewer hospital readmissions than patients who did not receive early mobility (Morris et al., 2011). One conclusion based on these studies is that early mobility may result in shorter hospital stays for the patient, fewer readmissions and cost savings for the hospital.

### **Benefit of Autonomy**

While education needs to be provided at all levels of the multidisciplinary team, it is imperative for the ICU nursing staff (Fitzpatrick et al., 2010). ICU nurses are a constant at the bedside, and are aware of the condition of their patients. Therefore, the ICU nurse can be a source of knowledge about their patients to the multidisciplinary team. The nurses who are not aware of the benefits of early mobility need education to augment their clinical decision making (Fitzpatrick et al., 2010). The nurse who is not educated on early mobility may feel their patient is not ready for any physical therapy. However, through education, more patients may be identified as able to participate in physical therapy and early mobility (Fitzpatrick et al., 2010). Nurses will also feel more comfortable having physical therapy and early mobility done on their patients if they know the risks are very minimal.

### **Clinical Practice Guidelines**

There are no clinical practice guidelines for early mobility at this current time. The American Thoracic Society and the European Respiratory Society have published clinical practice guidelines for pulmonary rehabilitation, which is related to early mobility (Nici et al., 2006). The guidelines that apply to the ICU setting include four parts and are referred to as follows. Low intensity training can be effective in producing physiologic benefit. Interval training may be useful in encouraging more exercise training in patients that are symptomatic.

Upper and lower extremity training should be done. A combination of strength and endurance training is generally well tolerated and has multiple benefits. Patients that suffer from muscle atrophy have a particular indication for this training (Nici et al., 2006).

### **ABCDE Bundle**

Common sequela for ICU patients is over sedation. This leads to prolonged mechanical ventilation which can subsequently lead to delirium and weakness (Balas et al., 2012). The ABCDE bundle has gained popularity recently as an approach to enhance the recovery of critically ill patients (Morandi, Brummel, & Ely, 2011). This bundle is a set of five evidence based practices which has been shown to improve outcomes of critically ill patients (Balas et al., 2012). Utilization of the five evidence based practices of Awakening, Breathing, Coordination, Delirium and Early mobility have been shown to decrease complications associated with an ICU stay and mortality (Morandi et al., 2011).

The term *Awakening* refers to sedation interruption or spontaneous awakening trials (Balas et al., 2012). These sedation interruptions or awakening trials are intended to give the patient a break from sedation, so they can have an assessment of reality. These trials have led to a decrease in ventilator days, length of stay and complications. The term *Breathing* refers to spontaneous breathing trials, which are associated with successful weaning from the mechanical ventilator (Balas et al., 2012). The term *coordination* refers to coordinating spontaneous breathing trials along with spontaneous awakening trails. The purpose of this coordination is to have the patient be awake, which will help their participation in the spontaneous breathing trial. This coordination has been shown to decrease ventilator time by three days, decrease ICU length of stay by four days and decrease mortality by 14% (Morandi et al., 2011). The D in the bundle refers to *delirium* prevention and treatment. The annual cost of caring for a patient on

mechanical ventilation with delirium is \$20.4 billion in the United States alone (Balas et al., 2012). Unfortunately, delirium is not recognized in 75% of patients that are affected because they have the hypoactive form (Morandi et al., 2011). The under recognition of delirium demonstrates why valid tools are necessary to check patients on a regular basis for delirium (Balas et al., 2012). Delirium needs to be recognized and prevented, as it is associated with multiple poor patient outcomes including higher mortality and poor functional and cognitive outcomes (Balas et al., 2012). The E in the bundle refers to *early mobility* (early and progressive physical therapy of patients that are in the ICU). A recent study showed that patients who received early mobility had a shorter duration of delirium and ventilator days (Balas et al., 2012). These patients were also more likely to return to a higher functional status at hospital discharge than patients who did not benefit from early mobility (Balas et al., 2012).

### **Summary**

While early mobility may initially seem controversial and make some health care providers in the ICU uneasy, it has been shown to have many benefits. With proper education and guidance, all ICU staff will be able to participate. Unfortunately, early mobility is not widely practiced. Multiple barriers need to be overcome for early mobility to be efficient and effective. Early mobility has shown through research to be the best and fastest way for a critically ill patient to recover (Fitzpatrick et al., 2010). Health care providers in the ICU already make such a difference in their patient's lives. Early mobility is another step to take that can help to optimize the outcomes of ICU patients. Early mobility is seen as an effective mechanism to alleviate the complications of bed rest and immobility (Hopkins & Spuhler, 2009).

### **Theoretical Framework**



The theoretical framework for this project is derived from Virginia Henderson's need theory. According to this theory, the objective of the nurse is to facilitate activities that promote recovery (Nicely & DeLario, 2011). The goal of these activities is a return of baseline function for the patient and to promote independence. According to Henderson, nursing care is patient focused and the nurse is responsible for trying to make their patients whole again (Nicely & DeLario, 2011). According to her concepts, the nurse is to do for their patients what they would do for themselves if they had the strength, will or knowledge to do so. Nurses are to do, help and work with their patients to increase independence so progress after hospitalization is not delayed (Nursing Theories: A Companion to Nursing Theories and Models, 2011).

Henderson's theory consisted of 14 activities for which a patient needs their nurse to help them to return to independence. Nine of the concepts are physiological, two are psychological, two are social to recreation and occupation and one is spiritual and moral. These 14 activities can be linked to the purpose of early mobility.

### **Physiological**

Breathing normally is the first of fourteen activities mentioned in Henderson's theory. As noted earlier, many studies have been done to show that early mobility is correlated with a decrease in ventilator time and average hospital length of stay. By nurses mobilizing their patients, they are helping them to wean off the ventilator which will in turn help them to breathe normally on their own. Eat and drink adequately is the second activity mentioned. Patients need to have adequate hydration and nutrition to be able to fully participate in early mobility. Nurses can advocate for IV fluids and for early nutrition in the form of tube feeding or IV nutrition where appropriate. Early mobility will also help patients eat and drink normally by them being weaned off mechanical ventilation early.

The third activity is eliminating body waste. A patient can be mobilized up to the restroom or a commode instead of using a bedpan. Exercise is also a common remedy for constipation. The fourth activity is maintaining desirable positions. Early mobility can help in optimizing patient comfort and preventing pressure ulcers. It may also make patients more aware of their bodies and give them the knowledge and strength to reposition themselves.

The fifth activity is sleep and rest. The exercise provided with early mobility will help patients to get better sleep. Patients that participate in physical therapy during the day are more likely to stay awake during the day and sleep at night (Needham & Korupolu, 2010). This day and night scheduling also helps to prevent delirium (Needham & Korupolu, 2010). Select suitable clothes-dress and undress is the sixth activity. Nurses can help protect their patient's dignity by ensuring their modesty while walking in a hospital gown. Maintaining body temperature within normal range by adjusting clothing and modifying the environment is the seventh activity. Prolonged mechanical ventilation puts patients at risk for infections such as pneumonia (Fitzpatrick et al., 2010). Early mobility can help patients wean off mechanical ventilation sooner, therefore potentially preventing some infections which may cause fevers.

The eighth activity is keeping the body clean and well groomed and protecting the integument. Through early mobility patients are positioned well and frequently to prevent pressure ulcers. The ninth activity is avoiding dangers in the environment and avoiding injuring others. All staff in the intensive care unit is responsible for patient safety. The staff needs to be especially vigilant with early mobilization patients and watch not only the patient, but also all the vital equipment used for that patient. It is also essential that the health care providers in the ICU providing early mobility practice proper body mechanics to prevent injuring themselves.

## **Psychological**

Communicating with others in expressing emotions, needs, fears, or opinions is the first psychological activity mentioned. The early mobility patient will benefit from increased interaction with all the members of the ICU multidisciplinary staff. Staff will also benefit from this activity. They can share their concerns over this new protocol with each other and have a debriefing together. The second psychological activity mentioned is to learn, discover, or satisfy the curiosity that leads to normal development and health, and use the available health facilities. Nurses can educate their patients on early mobility, and how the activity will be of a benefit to them.

### **Social to Recreation and Occupation**

Working in such a way that there is a sense of accomplishment is the first social activity. Nurses and patients will be able to see the benefits of early mobility. There is a great sense of accomplishment when nurses see their patients making advancements in their recovery. Play or participating in various forms of recreation is the second social activity listed. Early mobility is exercise and therefore, a type of recreational activity.

### **Spiritual and Moral**

Worshiping according to one's faith is the spiritual and moral activity included in Henderson's theory. Early mobility may not directly address spirituality. However, through early mobility, patients have shorter recovery time and greater independence. Exercise has also been shown to increase morale (Perme & Chandrashekar, 2009). This holistic approach of body and mind may help the patient in their spiritual life.

## **Chapter Three**

### **Methods**

Research has shown that early mobility in ventilated patients is crucial to augmenting recovery of critically ill patients (Needham et al., 2010). Unfortunately, it is not common practice in most intensive care units (Bailey et al., 2009). Early mobility can be accomplished in most ICUs with the proper guidance and training. The purpose of this performance improvement project was to evaluate the effect of an early mobility protocol among mechanically ventilated patients in the intensive care unit upon ventilator time, ICU and hospital length of stay.

#### **Design**

This project used a prospective cohort with a retrospective historical control group study design. Protocols from other hospitals that have early mobility protocols have been reviewed by the author. A protocol was then developed by adapting protocols from hospitals with early mobility programs to said hospital. Volunteers from critical care nursing, respiratory therapy, physical therapy, occupational therapy, the ICU clinical nurse specialist and the ICU director have been enlightened on early mobility. Those volunteers have formed a multidisciplinary team to be promoters of early mobility in their respective departments. All nurses in the ICU were educated on the early mobility protocol with a brief education session on early mobility by the volunteers.

Data was collected from prior to the mobility protocol and compared to data after the mobility protocol was implemented. The time period that data was collected from was April and May of 2011 which was compared to April and May of 2012. Data was collected on ventilator time, ICU length of stay, hospital length of stay, mortality and ventilator associated pneumonia rates approximately two months after the education had begun. This data was compared to

ventilator time, ICU length of stay, hospital length of stay, mortality and ventilator associated pneumonia rates prior to the initiation of early mobility. The data prior to the initiation of early mobility was collected at the same time of year (April and May) as the data collected two months after education was initiated to account for seasonal differences.

It is essential for the ICU patients participating in early mobility to be monitored at all times. This necessitates the use of a portable monitor for heart rate and rhythm, oxygen saturation, respiratory rate and blood pressure. The intensive care units (medical and surgical) have seven portable monitors between the two units. Adequate staff including a registered nurse and a respiratory therapist must also be available to assist with tubes and lines and assure they are properly secured. A gait belt was used with all patients while sitting on the edge of the bed, standing up, or walking, along with a wheelchair to follow behind the ambulating patients for rest periods. A special walker was purchased for the purpose of mobilizing patients in the ICU. Three additional recliner chairs and a cardiac chair with retractable arm rests were also purchased to assist in mobilization.

A three-phase protocol was initiated on eligible patients in the medical intensive care unit and surgical intensive care unit. The first phase includes patients that have profound weakness, limited activity tolerance and/or the inability to walk. The goal of phase one is to have the patient sit at the edge of the bed with minimal to no support, and to initiate standing and possibly prewalking activities. The second phase will include patients that are weak with limited activity tolerance, but able to stand. The goal of phase two is for the patient to start transfer training and walking reeducation, both with the assistance of a walker. The third phase includes patients that are weak, but able to tolerate an increased level of activity. The goal of phase three is

independent transfer training with a walker and progressive walking reeducation (Perme & Chandrashekar, 2009).

### **Setting and Sample**

This quality improvement project was done at a large metropolitan hospital in southern California. The hospital is a level 1 trauma center and has approximately 700 acute care beds. This project was conducted on a convenience sample of patient records of critically ill patient in the medical ICU and surgical ICU who would have derived benefit from early mobility. The sample size for this study was 97 patient's records.

Inclusion criteria for this project included records of patients that were critically ill. They must have been admitted to either the Medical Intensive Care Unit or the Surgical Intensive Care Unit of said hospital. The patients must have been of age 18 or older. They must also have been physiologically stable with no signs of active bleeding.

Exclusion criteria for this project consisted of records of patients that had any of the following: Inability to walk without assistance prior to their ICU stay, spinal cord injury, unstable intracranial pressure, unstable fractures, neuromuscular disease that could impair weaning, femoral sheaths (arterial or venous), comfort care, decline in hemodynamic or respiratory status, hypotension (MAP <60 or patient specific), tachycardia >110 bpm, unstable cardiac rhythm, multiple vasopressors, new vasopressor or antiarrhythmic drug within the last 24hrs, new myocardial infarction with EKG and enzyme changes, advanced mode of ventilation, Fio2 >0.6, PEEP >10, or RR >35. If a patient met any one of the above exclusion criteria, they may be reevaluated the following day to see if they were eligible for early mobility, depending on which criteria they met.

Criteria for stopping the physical therapy session were also developed. They included the following: extreme fatigue, intolerable dyspnea, significant chest pain, signs of cardiac ischemia or a sudden change in heart rhythm, low blood pressure associated with dizziness, diaphoresis or syncope, patient distress, fall to the knees, concern for airway integrity, SpO<sub>2</sub> < 88% for five minutes, heart rate > 130 for five minutes, respiratory rate > 40 for five minutes, or systolic blood pressure >180 for five minutes. The patient could elect to stop the physical therapy session at any time.

Patients who received early mobility therapy were better identified after nurse education. All ICU nurses received a brief education session in the form of a *one minute review*. *One minute reviews* are commonly used as brief education for staff in the ICU at said hospital. The education session included a brief summary of an article describing the ABCDE bundle, the early mobility protocol and information about the process of early mobility. The early mobility protocol form, which lists the exclusion criteria, was placed in the bedside books which are kept with each patient to help the nurses determine if their patient is a candidate for early mobility. Another form was developed early in the education period for the night shift charge nurses. The charge nurses were instructed to distinguish which patients were eligible for early mobility. They were then able to facilitate in obtaining orders that state “physical therapy/occupational therapy evaluate and treat activity as tolerated.” The form for the charge nurses was later eliminated due to concerns over the many forms that already needed to be filled out. A small section was dedicated on the charge nurse kardex, which was already in use, to be checked if the patient is a candidate.

After the order was entered into the computer, the patient was typically scheduled to receive early mobility the following day. The hospital in the study assigned one physical

therapist and one occupational therapist to spend a majority of their day in the medical and surgical ICU. They spoke to each nurse prior to working with the early mobility patients. Times for therapies are then coordinated with the bedside and charge nurse, physical therapy and respiratory therapy.

### **Instruments**

A data collection tool was used to collect data on the ICU patient records examined in this study. The form included information on ventilator days, delirium incidence via Confusion Assessment Method (CAM) score, ICU length of stay, hospital length of stay, average RASS score, restraint days, sedation days, sedation dose trend after physical therapy began, date and time physical therapy and occupational therapy began. Mortality rates and ventilator associated pneumonia (VAP) rates of said hospital were also analyzed for this period of time.

This project also measured functional mobility. A new functional mobility score was developed by an ICU physical therapist in Houston, Texas. While retrospective data collection was not possible, patient Perme mobility scoring became a standard for early mobility patients. This early mobility project was also being used to aid in validation of the Perme Mobility Score.

### **Procedure for Data Collection**

This project did not require approval by the Point Loma Nazarene University or Scripps Healthcare Institutional Review Boards (IRB) prior to initiation of the early mobility protocol as this was a quality improvement project. In order to protect human subjects from identification, only numbers were used to identify the patient records, and all patient records were coded for data entry. Since the early mobility protocol was a quality improvement (QI) project, it was included as a treatment and therefore covered under the hospital consent to treat. Therapy performed in this protocol was not considered experimental.



Data was collected from chart reviews utilizing the electronic medical records. All data was collected by the principal investigator with the exception of the mortality and VAP rates. This data was collected from the quality department at the hospital. All data was entered into a Microsoft excel spreadsheet by one person and checked by another. Data from patients prior to the protocol education and from 2 months after initiation of education on the early mobility protocol including total ventilator time, ICU length of stay and hospital length of stay was entered into a Microsoft excel spreadsheet. Data was stored on an internal hard drive and a portable flash drive in a double locked room.

### **Data Analysis**

Data was compiled into a statistical software program. Descriptive statistics were utilized to calculate the frequencies, percentage, means, medians and standard deviations. An independent t-test was performed to compare the mean ICU length of stay and hospital length of stay between pre and post early mobility protocol groups. Multiple regression analysis was conducted on post protocol scores to determine the strength of early mobility as a predictor variable. Analyses were performed using Microsoft Excel. For the purpose of this study, the significance level was set at 0.05.

## Chapter 4

### Results

Data was retrospectively collected on a total of 97 patient records. The control was a group of 58 records of individuals that were admitted to the Medical or Surgical ICU in April and May of 2011. This group of patient records was randomly selected by the ICU clinical nurse specialist. These patient records were compared to a group of 39 patient records who received early mobility in April and May of 2012. All data was double checked for accuracy.

Clinical outcomes were examined for mechanically ventilated patients at said hospital from April and May 2011 and April and May 2012. The percentage of patients on mechanical ventilation for greater than 96 hours decreased from 30.46 to 26.13. Conversely, the percentage of patients on mechanical ventilation for less than 96 hours increased from 70.2 to 73.39. Additional findings from this profile included ventilator associated pneumonia rates. The rate for 2011 was 0.86 which decreased in 2012 to 0.83.

Mean ICU length of stay from 2011 was 4.13 days compared to 2012 which was 5.47 days for individuals in this sample. The paired t-test and confidence interval for these values was not statistically significant with a  $p=0.259$ . Mean hospital length of stay from 2011 was 10.63 days compared to 2012 which was 16.13 days. The paired t-test and confidence interval for these values was  $p=0.044$ .

Mortality rates for ventilated patients were also examined from the clinical outcome profile. The overall mortality rate among ventilated patients decreased from 30.36 to 21.78 during the time period examined. This is a very significant clinical finding as this equates to approximately nine lives.

## **Chapter 5**

### **Discussion**

The purpose of this performance improvement project was to evaluate the effects of an early mobility protocol among critically ill patients in the intensive care unit. This project was able to demonstrate a decrease in ventilator time, VAP rate and mortality rate. The percentage of patients on mechanical ventilation for 96 hours or more decreased, while the percentage of patients on mechanical ventilation for less than 96 hours increased. This indicates that patients are mechanically ventilated for a shorter period of time. The VAP rates did decrease, which translates to better patient care and fewer reimbursement issues for the hospital. While ICU and hospital lengths of stay increased, the results were not statistically significant in relation to early mobility. The decrease in mortality rate was very clinically significant. The mortality rate was decreased by approximately nine lives. Just one life is clinically significant, but nine lives demonstrate a huge significance.

Due to the implementation of this project, nurses are now more aware of the positive impact that early mobility has on their patients. This project has served the patient and health care workers by delivering a higher quality of care. The importance of nursing in early mobility has been established.

### **Limitations**

The study limitations include being a single-site cross-sectional review. Therefore the study findings can be generalized to the patient population that said hospital serves. Another limitation is the patient sample in which data was collected on for the pre and post intervention data. The group of pre intervention patients was picked randomly, and the patients may or may not have been candidates for early mobility. The patients included in the post intervention data

were only patients on which early mobility was performed. This may have contributed to the data demonstrating an increase in ICU and hospital length of stay. An additional limitation was the short length of time from the education and implementation of early mobility in relation to data collection. Additionally, data was measured for only two months. A severe fluctuation in patient census was also noted between 2011 and 2012.

### **Future Research**

Recommendations for further studies include conducting this project at more than one hospital. Additionally data should be collected on pre and post intervention patients that meet inclusion and no exclusion criteria for early mobility. Data could also be collected for a period of six months or longer. Readmission rates, tracheostomy rates and discharge disposition would benefit from further analysis.

### **Conclusion**

As the population ages and technology advances, the number of patients requiring ICU care will continue to increase. In addition, more of these ICU patients are surviving to hospital discharge. Unfortunately, their condition at discharge is typically overlooked because the patient's life was saved. Physical and emotional disabilities become a reality for a number of patients who have lived the ICU experience.

An increasing amount of research is being done today to decrease the negative effects that patients acquire from their ICU stay. While a number of health care providers worldwide are starting to learn of ways to decrease these negative effects, improvements can still be made in the way that care is delivered. Some of the typical ICU care that patients have traditionally received has proved to be detrimental to them. Early mobility has been shown to improve long term outcomes of ICU patients. Early mobility is a big culture change; one that does not come

easily. This is a change that needs to be made in intensive care units worldwide, for the benefit of the patient.

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## Appendix A

### Data Collection Form

- 1) Date of hospital admission
- 2) Date of hospital discharge
- 3) Date of ICU admission
- 4) Date of ICU discharge
- 5) Ventilator days
- 6) Date and time physical therapy (PT) began
- 7) Date and time occupational therapy (OT) began
- 8) Incidence of delirium
- 9) Sedation days
- 10) Restraint days
- 11) Average RASS score
- 12) Sedation dose trend after initiation of PT/OT

## Early Mobility Protocol

### Contraindications to Early Mobility

- Inability to walk without assistance prior to their ICU stay
- Spinal cord injury
- Unstable intracranial pressure
- Unstable fractures
- Neuromuscular disease that can impair weaning
- Femoral sheaths (arterial or venous)
- Comfort care
- Decline in hemodynamic or respiratory status
- Hypotension (MAP <60 or patient specific)
- Tachycardia >110 bpm
- Unstable cardiac rhythm
- Multiple vasopressors
- New vasopressor or antiarrhythmic drug within the last 24hrs
- New myocardial infarction with EKG and enzyme changes
- Advanced mode of ventilation
- Fio2 >0.6, PEEP >10, RR >35

*If no contraindications are noted the patient may participate in early mobility*

Phase 1	Phase 2	Phase 3
Patients that have profound weakness, limited activity tolerance and/or the inability to walk	Patients that are weak with limited activity tolerance, but able to stand	Patients that are weak, but able to tolerate an increased level of activity
The goal of phase one is to have the patient sit at the edge of the bed with minimal to no support and to initiate standing and possibly prewalking activities	The goal of phase two is for the patient to start transfer training and walking reeducation, both with the assistance of a walker	The goal of phase three is independent transfer training with a walker and progressive walking reeducation

Obtain order for PT/OT evaluate and treat and activity as tolerated

## Appendix C

**Early Mobilization Screening Tool**

MICU

SICU

10<sup>th</sup> Floor ICU

<b>Bed #</b>	<b>Patient Sticker</b>	<b>Candidate for Early Mobilization</b>	<b>Order for PT/OT in Chart/CE</b>	<b>Order for "activity as tolerated"</b>
<b>1</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>2</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>3</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>4</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>5</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>6</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>7</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>8</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>9</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>
<b>10</b>		<b>Yes No</b>	<b>Yes No</b>	<b>Yes No</b>

## Appendix D

### The Early Mobilization Committee Presents:

#### **Key Points in the “ABCDE BUNDLE” (Awakening & Breathing Coordination, Delirium Monitoring and Management, and Early Mobility)**

3 distinct but highly interconnected components: coordinated daily awakening and SBTs, monitoring for and managing delirium, and early mobility.

- \* Oversedation and prolonged mechanical ventilation can subsequently lead to delirium and weakness.
- \* Daily Awakening leads to decreased duration of mechanical ventilation, shorter ICU stays, and patients experience fewer complications (VAP, UGIB, bacteremia...) and patients have fewer symptoms of PTSD after critical illness.
- \* RN and RT coordinated daily awakening and SBT's significantly shorten time to extubation.
- \* ICU-acquired delirium and weakness (often under diagnosed and difficult to identify without the use of a screening tool ie: the CAM-ICU scale) influence a patient's ability to survive critical illness, and are also associated with poor long-term physical, functional and cognitive outcomes. Patients are more likely to be discharged to a rehab/SNF instead of home, and have higher 6 month and 1 year mortality rates.
- \* The estimated cost of caring for delirious patients who require mechanical ventilation in the U.S. alone is \$6.5 to \$20.4 billion annually.
- \* Patients who experience early exercise and mobilization have shorter duration of delirium, less vent days and are more likely to return to independent functional status at hospital discharge.

We already perform daily awakenings and SBTs, and monitor/treat delirium, so we are ready to initiate the last component of the bundle: Early Mobilization!

This means that together we can help keep our patients calm and out of restraints with less use of sedative medications, and help them overcome their critical illness more quickly and with less complications!

## Appendix E



11025 North Torrey Pines Road  
Suite 200  
La Jolla, CA 92037

Date: 2/21/2013

Thank you for submitting your concept idea for evaluation of human subjects protection. It has been determined that your topic: Implementation of an Early mobility in the ICU is not human subjects research requiring IRB approval because of the following:

- Evidence-based practice change or Performance Improvement project
- is not randomized, results will be monitored throughout the change
- constitutes a change in practice that has been published previously by others
- does not incur a risk to patients
- does not include contact with patients that would be considered outside of the realm of quality monitoring or performance improvement (type feedback or focus groups)
- has not received federal funding

**Your project is considered:**

- Evidence-based practice change: Implementing a new process to Scripps Health that has been supported in the literature or by best practice established at another facility.
- Performance Improvement: Implementing a change to bring Scripps outcomes up to industry standards.

As such, according to regulatory standard and Scripps Health operating procedure, **the Department of Quality will provide approval and oversight** for your project to assure the safety of our patients and alignment of the project to organizational goals and objectives.

**Publishing**

When publishing your project, refer to the project as a "**project**" and not a "study".

Refer to yourself as a "**change agent**" and not an "investigator".

When considering a theoretical framework, an evidence-based practice change model might be appropriate.

Do NOT use research terms to describe your methods, e.g. do **not** use quasi-experimental; instead use "**pre- and post test of change**"

Follow the SQUIRE guidelines for publication

Submit the publication to the Director of Quality for review **prior** to submission to the editor

Further guidance is attached in a literature review.

Respectfully,

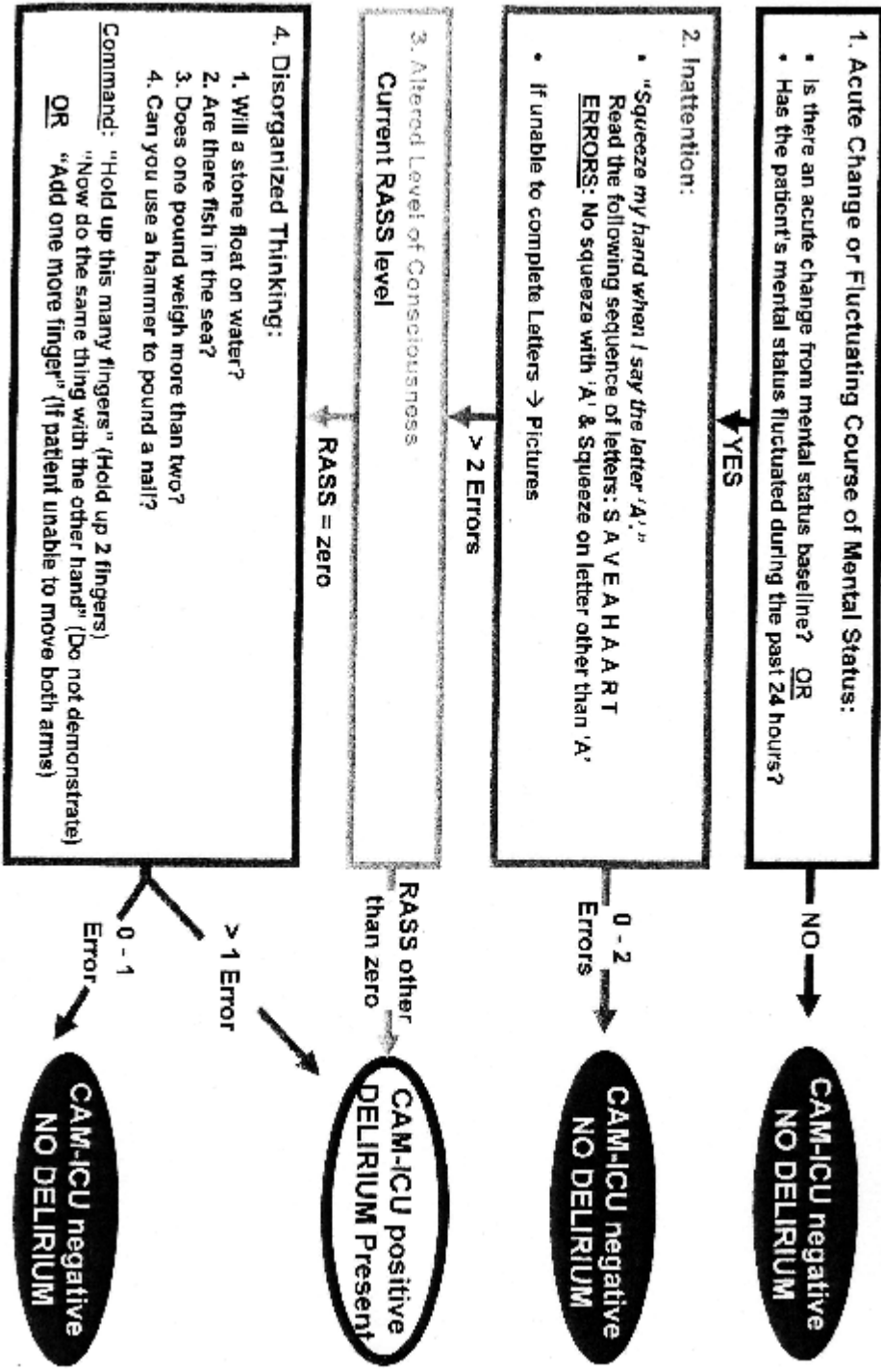
*Judy E. Davidson*

Judy Davidson, Director Research Integration and Management

*Barbara J. Bigby*

Barbara Bigby, Director, Scripps Office for the Protection of Research Subjects

## Confusion Assessment Method for the ICU (CAM-ICU) Flowsheet



Appendix F

## Appendix G

## Richmond Agitation Sedation Scale (RASS) \*

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff	
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive	
+2	Agitated	Frequent non-purposeful movement, fights ventilator	
-1	Restless	Anxious but movements not aggressive/vigorous	
0	Alert and calm		
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to <i>voice</i> ( $\geq 10$ seconds)	} Verbal Stimulation
-2	Light sedation	Briefly awakens with eye contact to <i>voice</i> ( $< 10$ seconds)	
-3	Moderate sedation	Movement or eye opening to <i>voice</i> (but no eye contact)	
-4	Deep sedation	No response to <i>voice</i> , but movement or eye opening to <i>physical</i> stimulation	} Physical Stimulation
-5	Unarousable	No response to <i>voice</i> or <i>physical</i> stimulation	

## Procedure for RASS Assessment

1. Observe patient
  - a. Patient is alert, restless, or agitated. (score 0 to +4)
2. If not alert, state patient's name and say to open eyes and look at speaker.
  - b. Patient awakens with sustained eye opening and eye contact. (score -1)
  - c. Patient awakens with eye opening and eye contact, but not sustained. (score -2)
  - d. Patient has any movement in response to *voice* but no eye contact. (score -3)
3. When no response to verbal stimulation, physically stimulate patient by shaking shoulder and/or rubbing sternum.
  - e. Patient has any movement to *physical* stimulation. (score -4)
  - f. Patient has no response to any stimulation. (score -5)

\* Sessler CN, Gosnell M, Grap MJ, Brophy GT, O'Neal PV, Keane KA et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care patients. *Am J Respir Crit Care Med* 2002; 166:1338-1444.

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