

Early Mobility Intervention for Hip Fracture Patients

Christina Vejnovich

Nebraska Methodist College

Dr. Meg Kinney and Dr. Lyndsi Hall

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Abstract

Problem: When geriatric patients are immobilized or placed on bedrest, loss of function and decreased activity levels are common. Prolonged immobility is associated with a decline in muscle strength and mass, as well as physical and cognitive function, thereby leading to delays in functional recovery as well as delays in hospital discharge. The purpose of this project was to address the consequences of prolonged immobility in hip fracture patients and evaluate a potential solution to improve patient outcomes. **Intervention:** Nursing staff initiated an early mobility intervention that comprised of mobilization of hip fracture patients on the day of surgical repair. The early mobility intervention included dangling the patient on the side of bed and performing range of motion exercises to the upper extremities within 8 hours of patient returning from surgery. The intervention was repeated on post-operative day one. **Measures:** Hospital length of stay and prevalence of hospital acquired delirium was evaluated in the pre and post intervention group. Delirium was assessed by nurses utilizing the Nurse Delirium Screening Scale (NuDESC). The prevalence of positive delirium scores at discharge were compared in the pre and post intervention group. **Results:** Results of the study were clinically significant (length of stay decreased by 0.7 days and hospital acquired delirium at discharge decreased from 20% to 0%); however, not statistically significant (Hospital Length of Stay: $t(19.579) = (-0.92572)$, $p = 0.3659$, Presence of hospital acquired delirium: $\chi^2(1) = 0.11324$, $p = .7365$). **Conclusion:** Early mobilization on the day of surgery decreased hospital LOS and the prevalence of hospital acquired delirium. Additionally, the study found that initial mobilization of hip fracture patients can safely and effectively be performed by bedside nursing staff. **Keywords:** Early mobility protocol, hip fracture, hip fragility, geriatric, mobilization.

Early Mobility Intervention for Hip Fracture Patients

Overview

According to the Center for Disease Control and Prevention (CDC) (2016), each year over 300,000 Americans aged 65 and older are hospitalized for a hip fracture. It is estimated that one out of every 20 individuals will suffer a hip fracture in their lifetime (Fernandez-Moyano et al., 2014). Not only is the prevalence of hip fracture high, in older adults, they are concomitant with poor outcomes such as loss of independence, decreased quality of life, high mortality, and ensuing health care costs. Increasing health care expenditures are the result of increased hospital length of stay and an average of 14.5% post discharge hospital readmission rate. Furthermore, the one-year mortality rate post hip fracture is approximately 25%. Of those that survive, approximately 30% will have a permanent disability and 40% will suffer a loss of independence (Bernstein, 2015; Kuru & Olcar, 2020). The purpose of this project was to address the consequences of prolonged immobility in hip fracture patients and discuss a potential solution to improve patient outcomes.

Problem Description

In clinical practice, delayed surgery for hip fractures is common due to limited surgical capacity, need for medical stabilization or reversal of anticoagulation prior to surgery (Klestil et al., 2017). Surgical delays compounded with post-operative bedrest orders and/or lack of availability of therapy staff for early mobilization increases patients overall time spent immobilized in bed. When geriatric patients are immobilized or placed on bedrest, loss of function and decreased activity levels are common (Kuru & Olcar, 2020). Prolonged immobility is associated with a decline in muscle strength and mass, as well as physical and cognitive function, thereby leading to delays in functional recovery as well as delays in hospital discharge (Walker, 2018; Kuru & Olcar, 2020). Delirium, often caused by immobility, occurs in approximately 24-70% of hospitalized hip fracture patients, and contributes to

poor patient outcomes, specifically related to increased hospital length of stay, loss of independence, and mortality (Yang et al., 2017).

Interventions aimed towards decreasing the length of time a patient spends immobilized after surgery are associated with improved patient outcomes (Kenyon-Smith et al., 2019). This leads to question, if hip fracture patients are mobilized on the day of surgery rather than 24 hours post-surgical intervention, thereby minimizing the length of time spent immobilized, would the prevalence of delirium and hospital length of stay be decreased?

Available Knowledge

Interventions

Early mobility protocols in hip fracture patients have been well researched in the last several years. Early mobility is defined as less than 24 hours between operation and time of first mobilization (Baer et al., 2019; Rutenberg et al., 2018; Kuru & Olcar, 2020; Su et al., 2018). Although some findings outline the benefits of early mobilization conducted by physical therapy (Rutenberg et al., 2018), several studies focused on the benefits achieved by early mobilization performed by any healthcare provider (Su et al., 2018; Kenyon-Smith et al., 2019). For example, Rutenberg et al. (2015), performed a retrospective cohort study to analyze the effects of delaying initiation of physical therapy (PT) after surgical intervention on patient outcomes. Delays in physical therapy (PT) are commonly seen over weekends and holidays. Overall delays in patients receiving physical therapy were linked to increased mortality rates. In comparison, Su et al. (2018) performed a cross sectional analysis to evaluate the associations of rehabilitation interventions with post-operative hip fracture outcomes. The outcome of the study revealed that hip fracture patients mobilized early, whether by a physical therapist or other health care professional, had similar mobility outcomes; suggesting that the first mobilization post-surgical intervention need not be delayed due to lack of availability of physical therapy staff.

A number of studies reviewed the influence of length of time between surgical repair of hip fracture and first mobilization. In many studies, mobilization of the patient was categorized as (a) within 24 hours of surgery (b) between 24- and 48-hours following surgery, (c) after 48 hours following surgery. Findings suggested that a shorter time between operation and first mobilization were associated with significantly lower in-hospital mortality and complications (Baer et al., 2019; Kenyon-Smith et al., 2019; Kuru & Olcar, 2020). There are no studies focused directly on mobilizing the patient the day of surgery. Day of surgery mobilization data is incorporated into the within 24-hour category. However, numerous studies highlighted that improving postoperative mobility of hip fracture patients is key to success. Interventions aimed towards decreasing the overall length of time a patient spends immobilized is associated with improved patient outcomes (Baer et al., 2019; Ferris et al., 2020; Kenyon-Smith et al., 2019; Kuru & Olcar, 2020; Rutenberg et al., 2018; Su et al., 2018).

Throughout the literature, early mobilization interventions are defined in different ways. Many studies provided no definition of mobility intervention (Baer et al., 2019; Ferris et al., 2020; Kenyon-Smith et al., 2019). Whereas early mobility is defined by the ability to sit or stand (Su et al., 2018) or the ability to mobilize utilizing full or partial weight bearing status (Kuru & Olcar, 2020). Rutenberg et al. (2018) provides specifications of early mobility to include range of motion and strengthening exercises performed in bed on post-operative day one and bed to chair transfers on post-operative day two.

Outcomes

Improved patient outcomes associated with early mobilization of hip fracture patients are evident throughout the literature. Findings suggest that use of early mobility protocols are associated with lower mortality rates and decreased complications to include decreased occurrence of urinary tract infections, pneumonia and venous thromboembolism (Baer et al., 2019; Ferris et al., 2020; Kuru & Olcar, 2020; Rutenberg et al., 2018). Two studies identified a significant reduction in the occurrence of hospital acquired delirium in patients that were mobilized early (Kenyon-Smith et al., 2019; Kuru &

Olcar, 2020). For example, Kenyon-Smith et al. (2019) revealed that the risk of developing a post-operative complication increased the longer it took the patient to mobilize following surgery. Delirium was the only complication that was statistically significantly reduced in patients who mobilized compared to remaining bedbound. For patients who developed postop delirium, the odds of developing other complications were higher at 39%.

Following hip fracture surgery, Rutenberg et al. (2015) identified that patients with longer in-hospital upright position time had improved gait features and reduced fear of falling at discharge. Comparatively, Su et al. (2018) determined that early mobilization is associated with better mobility function and improved discharge destination outcomes. Kuru & Olcar (2020) noted that patients mobilized within 24 hours of surgery had a lower hospital length of stay compared to patients mobilized after 24 hours.

Kuru & Olcar (2020) indicated that patients with the lowest hospital length of stay were patients who were mobilized within the first 24 hours after surgical intervention. Therefore, it is plausible to suspect that nursing staff mobilizing post-surgical hip fracture patients the day of surgery may decrease hospital length of stay. As previously discussed, prolonged immobility is linked with the development of delirium. According to Gallegos (2018), patients with postoperative delirium have an increased hospital length of stay, an average of four days longer than patients without delirium. Thus, early mobilization of patients may decrease the occurrence of delirium and thereby also contribute to a shorter hospital length of stay.

Synthesizing the available research allowed for the assumption that bedside nursing staff could safely mobilize a post-surgical hip fracture patient on the day of surgery, thereby negating delays due to the availability of therapy staff. Day of surgery mobilization may include but is not limited to, dangling the patient at bedside, standing and/or transferring patient to chair.

Rationale

This project utilized the Iowa Model to translate the evidence-based research associated with early mobilization into a hospital clinical setting targeting the hip fracture population. The components of the model address: a) identifying triggering issues/opportunities, b) stating the research question, c) formation of a team, d) assemble, appraise, and synthesize body of evidence adoption, e) design and pilot the practice change, f) integrate and sustain practice change and g) dissemination of results (Cullen et al., 2018).

The triggering issue that this project aimed to address was prolonged immobilization of hip fracture patients leading to loss of function and poor patient outcomes (Kuru & Olcar, 2020). The research question was: If hip fracture patients, age 65 and older, were mobilized on the day of surgery rather than 24 hours post-surgical intervention, thereby minimizing the length of time spent immobilized, would the prevalence of delirium and hospital length of stay be decreased?

Upon identification of the issue and determination of the research question, an interdisciplinary team of key players was developed to make the project successful. The team included bedside nurses on the orthopedic unit, nursing assistants, physical therapists, occupational therapists, case management as well as leaders of the orthopedic unit and therapy teams.

A thorough review of literature revealed that the risk of developing a post-operative complication increases the longer the patient is immobilized following surgery. Mobilization of hip fracture patients the day of surgery has been associated with improved outcomes when compared to patients with delayed mobilization (Baer et al., 2019; Ferris et al., 2020; Kenyon-Smith et al., 2019; Kuru & Olcar 2020; Rutenberg et al., 2018).

The last steps of the process included implementation and monitoring of the practice change, data analysis and feasibility to sustain the change. Lastly, results of the project were disseminated to senior leaders of the organization as well as presented at a local research conference.

Purpose

The purpose of this project was to determine if mobilizing geriatric hip fracture patients the day of surgery compared to mobilizing the day after surgery reduces the prevalence of hospital acquired delirium and decreases overall hospital length of stay. The project aimed to design, pilot, and evaluate the effectiveness of an early mobility protocol. The specific aims of this study were to:

1. Design and pilot a change in practice by implementing an early mobility protocol aimed at decreasing the amount of time hip fracture patients are immobilized
2. Evaluate the effectiveness of an early mobility protocol in the hip fracture population

Methods

Context

The project was implemented on an orthopedic unit in a Midwestern tertiary hospital. The hospital admits approximately 200-250 hip fracture patients age 65 years or older annually to the orthopedic unit of the hospital. Inclusion criteria comprised of patients admitted to the orthopedic unit who underwent orthopedic surgery (internal fixation, hemiarthroplasty, or total hip arthroplasty) with a fragility hip fracture (femoral neck, intertrochanteric or subtrochanteric fracture). Exclusion criteria included patients that opted for medical management of hip fracture, palliative care, or hospice care.

The organization for implementation has a strategic initiative to meet the unique needs of the older adult by full implementation of the Institute for Healthcare Improvement's (IHI) Age Friendly Health Systems 4M's Framework. The framework includes interventions that improve mobility, mentation, medications, and what matters most to the patient (Institute for Healthcare Improvement, 2020). Implementation of an early mobility protocol for hip fracture patients with a goal of improving length of stay and decreasing the prevalence of hospital acquired delirium was in line with the organization's strategic initiative.

Intervention(s)

Nursing staff (nurses and nursing assistants) on the orthopedic unit initiated mobilization of post-surgical hip fracture patients on the day of surgical repair of the hip fracture. The early mobility intervention included dangling the patient on the side of the bed and performing passive or active range of motion exercises to the upper extremities within 8 hours of patient returning to the orthopedic unit from the post anesthesia care unit (PACU). Passive versus active range of motion was determined based on the patient's ability and trunk stability. The dangling on side of bed with upper body range of motion exercises intervention was repeated in the early morning on post-operative day one. Previous practice allowed for physical therapy and occupational therapy to assess and treat patients on post-surgical day one. This practice continued. However, with the support of the therapy team, the early mobility intervention was performed by nursing staff prior to assessment and treatment by physical and occupational therapy. Patients that were not hemodynamically stable were excluded from participating in the intervention.

Nursing and therapy staff received live education which explained the change of practice, timing of intervention and mobility expectations in early February of 2021. The intervention was then initiated mid-February of 2021. Nursing staff were asked to document the patient's ability to participate in the intervention, timing of intervention and the length of time the patient was able to tolerate dangling at the bedside.

Study of the Intervention(s)

A retrospective chart review was performed on all hip fracture patients admitted to the orthopedic unit for surgical repair of hip fracture for the 30 days prior to study intervention implementation and 30 days after implementation of the study intervention. The chart review included the patient's age, gender, mobility status prior to admission (community ambulator/home ambulator/immobile), hospital length of stay, assessed delirium scores upon admission, two days post-

surgical intervention and at discharge and time in hours from surgical intervention to first mobilization (see Appendix A). Data was stored in a secure database on a password protected computer. In this study, descriptive statistical analysis was conducted for each study aim. In addition, statistical correlation analyses were conducted to examine interrelationships between early mobilization and the prevalence of inpatient delirium as well as any variation in hospital length of stay. Analysis included variations in outcomes between gender, age, and mobility status prior to admission.

Measures

Early mobilization of patients post hip fracture surgery is associated with shorter hospital length of stay as well as a reduction in the occurrence of hospital acquired delirium (Kenyon-Smith et al., 2019; Kuru & Olcar, 2020). Therefore, outcomes for this study were measured by analyzing hospital length of stay and the prevalence of hospital acquired delirium. Length of stay measurements and delirium scores were obtained from the electronic medical record. Delirium is currently assessed by nurses within the electronic medical record utilizing the Nurse Delirium Screening Scale (NuDESC). The NuDESC is validated in postoperative inpatients with a sensitivity and specificity of 98 and 92%, respectively (Neufeld et al., 2013). It is composed of five categories: disorientation, inappropriate behavior, inappropriate communication, illusions/ hallucinations, and psychomotor retardation. Patients are screened in each of each the five categories as 0, 1, or 2, depending on the severity of his or her behaviors. If the combined score is two or greater, the patient screens positive for delirium (Neufeld et al., 2013). The percentage of positive delirium scores were used to compare the prevalence of hospital acquired delirium in the pre and post intervention group.

Analysis

Data was collected, stored, and analyzed utilizing Excel software. Descriptive statistics were used to describe the population. Variables included age, gender, and mobility level prior to hospital admission (community ambulator, home ambulator, and immobile). Hospital length of stay and

delirium prevalence was compared in the pre intervention group and post intervention group utilizing an independent samples t-test to determine the significance of the early mobility intervention decreasing overall hospital length of stay and/or the prevalence of hospital acquired delirium.

Ethical Considerations

Permission to conduct this DNP project was obtained through the Service Leader of the Orthopedic/Neurology Unit and the Clinical Partner at the study hospital. Permission to proceed with the project was obtained through the Institutional Review Board prior to commencing the study. Data was collected through a retrospective chart review and stored in a secure database on a password protected computer. There were no conflicts of interest identified. Collaborative Institutional Training Initiative (CITI) education was completed.

Results

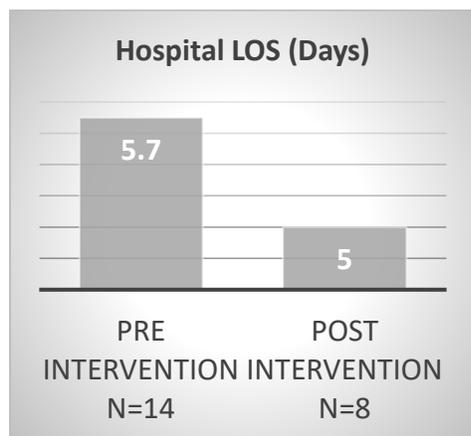
Demographic data is shown in Table 1. Average age varied by 7 years in the pre and post intervention group. In relation to gender, there was a moderate amount of variation between sex of the participants in the pre-intervention group compared to the post-intervention group. Minimal variation of independence (independent prior to hospital admission versus required assistance with mobility prior to hospital admission) was noted between the pre and post intervention group. Overall, the demographic data from both groups was quite comparable. However, due to the small sample size, associations between demographic variables (age, sex, mobility status prior to admission) and the main variables of interest (hospital length of stay and hospital acquired delirium) were unable to be conducted.

Table 1*Demographic Data*

Variable	Pre-Intervention Group <i>N</i> = 14	Post-Intervention Group <i>N</i> = 8
Average Age	84	77
Male	43%	20%
Female	57%	80%
Independent Prior to Admission	79%	75%
Required Assistance Prior to Admission	21%	25%
Average Time to Initial Mobilization (Hours)	16	6

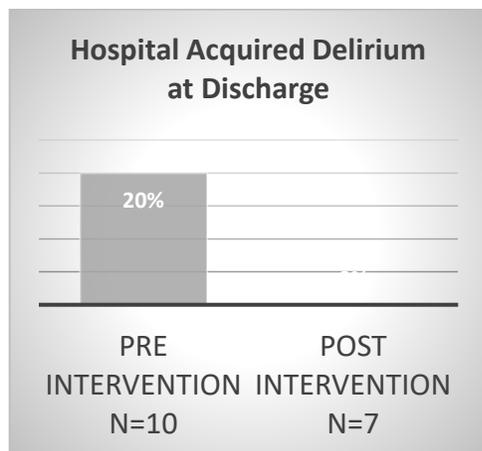
Length of stay pre and post intervention was analyzed. An independent-samples t-test was conducted to compare hospital length of stay of patients that were first mobilized the day of surgery and patients that were first mobilized the day after surgery. There was not a significant difference in the scores for first mobilization the day of surgery ($M=5.000000$, $SD=-2.3260377$) and first mobilization the day after surgery ($M=5.714286$, $SD=0.8974663$) conditions; $t(19.579) = (-0.92572)$, $p = 0.3659$. While the results were not statistically significant, they were in fact clinically significant. The average hospital length of stay for the pre intervention group was 5.7 days whereas the post intervention group's average length of stay was 5 days. Overall, the intervention decreased average hospital length of stay by 0.7 days. See Figure 1.

Figure 1



Prevalence of hospital acquired delirium was compared pre and post intervention. A chi-square test of independence was performed to examine the relation between early mobilization of hip fractures and the prevalence of hospital acquired delirium. The relation between these variables was not statistically significant, $\chi^2(1) = 0.11324$, $p = .7365$. However, when comparing actual prevalence of hospital acquired delirium in the pre and post intervention group, 20% of the pre-intervention group developed delirium during their hospital stay while 0% of the post-intervention group developed delirium during their hospital stay. The reduction of hospital acquired delirium indicates clinical significance. Results based on $N=8$ in pre-intervention group and $N=7$ in the post intervention group. See Figure 2.

Figure 2



Discussion

Summary

The intent of this quality improvement project was to determine if mobilizing geriatric hip fracture patients the day of surgery compared to mobilizing the day after surgery reduced the prevalence of hospital acquired delirium and decreased overall hospital length of stay. The project aimed to design, pilot, and evaluate the effectiveness of an early mobility protocol. The specific aims of this study were to design and pilot a change in practice by implementing an early mobility protocol aimed at decreasing the amount of time hip fracture patients are immobilized as well as evaluate the effectiveness of an early mobility protocol in the hip fracture population.

Implementation of the early mobility protocol effectively reduced patients average time spent immobilized after surgery by 10 hours as well as indicated a reduction in hospital length of stay by 0.7 days. Additionally, the prevalence of hospital acquired delirium was non-existent in the study population of patients that participated in the early mobility intervention.

Interpretation

According to Walker (2018) and Kuru & Olcar (2020), prolonged immobility is associated with a decline in muscle strength and mass, as well as physical and cognitive function, thereby leading to delays in functional recovery as well as delays in hospital discharge. Additionally, Kuru & Olcar (2020) indicated that patients mobilized within 24 hours of surgery had a lower hospital length of stay compared to patients mobilized after 24 hours. Due to pain and functional instability, hip fracture patients have notoriously been immobilized for extended periods of time. In this study, the aim to decrease the amount of time patients spent immobilized was met. Patients were mobilized the day of surgery an average of 6 hours after returning from surgery to the orthopedic unit. These patients showed an overall decrease in hospital length of stay and hospital acquired delirium in comparison to the patients mobilized the day after surgery.

Decreases in hospital length of stay for hip fracture patients are associated with decrease health care cost and lower mortality rates (Nikkel et al., 2015). Additionally, development of hospital acquired delirium increases hospital length of stay an average of four days longer than patients without delirium (Gallegos, 2018). Therefore, efforts geared towards safely reducing hospital length of stay and hospital acquired delirium are often in the forefront of strategic health initiatives. Optimizing and reducing hospital length of stay improves financial and clinical outcomes by decreasing the costs of care and minimizing the risk of developing hospital acquired conditions.

Limitations

The study had several limitations in relation to small sample size. There was a general decrease in admission of hip fracture patients during the study time period in comparison to previous years. Just prior to the study intervention, the Orthopedic unit at the study hospital was transitioned to care for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) patients resulting in patients with hip fracture being placed post surgically on non-orthopedic units. During the pre-intervention time frame for data collection, reduced documentation requirements referred to as essential documentation had been instituted at the hospital in response to SARS-CoV-2 to allow for more nursing time at the bedside during this time of critical need. The NuDESC delirium screening tool was not part of the Essential Documentation Band in the electronic medical record and therefore, was often not documented during the pre-implementation phase, thereby reducing capture of hospital acquired delirium. Overall, reduced hip fracture admissions to the hospital and orthopedic unit compounded with reduced documentation of the prevalence of the delirium variable significantly reduced the sample size from what was originally expected.

Conclusions

The revised standards for quality improvement reporting excellence (SQUIRE 2.0) was used as a framework for reporting this project. The study addressed complications associated with prolonged

immobilization of hip fracture patients. Findings suggest that early mobilization of hip fracture patients on the day of surgery decreased the occurrence of the post-operative complication of hospital acquired delirium and decreased overall hospital length of stay. Reducing post-operative complications and/or hospital length stay has the potential to decrease the financial burden placed upon patients as well as health systems. Additionally, the study further suggested that initial mobilization of hip fracture patients' post-surgical intervention can safely and effectively be performed by bedside nursing staff which eliminates delays related to availability of therapy teams for mobility evaluation. Future recommendations include replication of the study with a larger sample size to further determine if early mobility alone impacts hospital length of stay and/or the prevalence of hospital acquired delirium.

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