Movement is Medicine: The Effect of a Structured Mobility Program on Functional Decline in Hospitalized Older Adults

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Movement is Medicine: The Effect of a Structured Mobility Program on Functional Decline in Hospitalized Older Adults

Abstract

Abstract Functional decline is defined as the consequence of physiological changes of aging resulting in the inability to perform self-care activities independently. Hospitalized older adults are more likely to decline in functional status resulting in longer length of stay. Hospital care is often focused on treating acute illness while functional status is overlooked. Low mobility and bedrest are common occurrences during hospitalization. The most predictable and probably most preventable cause of functional decline is deconditioning from bedrest and reduced mobility. The purpose of this study was to determine if an early ambulation program can maintain functional levels for hospitalized older adults who were mobile preadmission. The research design was a quantitative, quasi-experimental, equivalent control group. The intervention tested the effects of a structured walking program on functional status in hospitalized older adults. The independent variable was the mobility protocol and the dependent variables were functional status and length of stay. Data were analyzed to address the two research questions. The intervention group tends to have higher HARP scores indicating that they were more at risk for functional decline. The majority of them had the same HARP scores upon discharge which was a goal of the researcher, signifying that patients did not leave the hospital with a decline in the function with which they had originally been admitted. Those participants admitted with respiratory or cardiac disorders benefited the most from the walking intervention which speaks to their strengthening activity intolerance. Evidence exists that targeted interventions can impact the degree of functional independence for hospitalized older adults. Further research on a larger sample with more inclusion criteria is warranted.
Movement is Medicine: The Effect of a Structured Mobility Program on Functional Decline in Hospitalized Older Adults

By

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Submitted in partial fulfillment of the requirements for the degree

Ed.D. in Executive Leadership

Supervised by

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St. John Fisher College

May 2012
Dedication

This work is dedicated to my parents, Rene and Lisette Pierre, whose love, dedication and sacrifice have made me the person I am today. They taught me the value of education and perseverance. They have always supported me through good and challenging times. They have instilled in me that anything was possible through hard work.

And to my husband, Clinton A. Bell, who informed me about the doctoral program and encouraged me to apply. His unconditional love and support throughout the journey made it possible. This dissertation could not be completed without his enormous contribution to the family household.

Finally, my two precious daughters, Diarra & Mekada, who may not have fully understood my absence at times, but were patient and understanding as I completed my coursework. I hope to serve as a role model as they pursue their education.
Biographical Sketch

Born in the country originally named Zaire (now The Republic of Congo), Marie (Pierre) Bell immigrated to New York City as a preschooler in the early 1970s with her parents and older sisters. She attended Sacred Heart Elementary School in Manhattan and went on to Notre Dame for High School. Marie J. Bell is currently a Clinical Assistant Professor in Nursing at Nazareth College of Rochester and a Geriatric Resource Nurse at the University of Rochester Medical Center. Dr. Bell earned her bachelor’s degree in nursing at the University of Rochester in 1994 and a master’s degree from Nazareth College of Rochester as a Gerontological Nurse Practitioner in 2008.

She began her coursework for her doctorate studies in the Ed.D. program in Executive Leadership from St. John Fisher College in 2008. Dr. Bell’s research focused on functional decline in hospitalized older adults under the direction of Dr. Dianne Cooney-Miner and received her degree in May 2012. For further information please contact Dr. Bell at mbell5@naz.edu.
Acknowledgements

This journey would not be possible without the constant support and encouragement that I have received along the way. I would like to thank my good friend Uzara B. Carson for her advice, wisdom and best wishes.

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I would like to acknowledge Dr. Dianne Cooney Miner, my dissertation chair, for her patience, knowledge and guidance as a professional and leader.

I would like to acknowledge Dr. William Stroud for his mentoring, service and enriching conversations, Dr. Marie Cianca who has held me accountable for continuing the journey and Dr. Lynn Nichols for her quick, yet efficient feedback with statistical analysis and her editorial guidance.

Finally, special thanks to Debra Whitman from State Farm Insurance Company for donating the pedometers provided to the participants.
Abstract

Functional decline is defined as the consequence of physiological changes of aging resulting in the inability to perform self-care activities independently. Hospitalized older adults are more likely to decline in functional status resulting in longer length of stay. Hospital care is often focused on treating acute illness while functional status is overlooked. Low mobility and bedrest are common occurrences during hospitalization. The most predictable and probably most preventable cause of functional decline is de-conditioning from bedrest and reduced mobility.

The purpose of this study was to determine if an early ambulation program can maintain functional levels for hospitalized older adults who were mobile preadmission. The research design was a quantitative, quasi-experimental, equivalent control group. The intervention tested the effects of a structured walking program on functional status in hospitalized older adults. The independent variable was the mobility protocol and the dependent variables were functional status and length of stay.

Data were analyzed to address the two research questions. The intervention group tends to have higher HARP scores indicating that they were more at risk for functional decline. The majority of them had the same HARP scores upon discharge which was a goal of the researcher, signifying that patients did not leave the hospital with a decline in the function with which they had originally been admitted. Those participants admitted with respiratory or cardiac disorders benefited the most from the walking intervention which speaks to their strengthening activity intolerance. Evidence exists that targeted
interventions can impact the degree of functional independence for hospitalized older adults. Further research on a larger sample with more inclusion criteria is warranted.
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Chapter 1: Introduction

Demographics show that the older adult population is growing and life expectancy is increasing. The emphasis is being placed on living long and living well. Since the 1950s, healthcare professionals have recognized the importance of incorporating wellness goals in caring for older adults, however there are many conceptual and practical barriers. Barriers to promoting wellness in older adults include older adults’ negative attitudes about being able to improve, the existence of more serious and pressing health concerns, the focus of health care environments on disease treatment rather than prevention or health promotion, the false attribution of symptoms of pathologic conditions to normal aging processes, and the belief that older adults are not capable of learning and implementing health-promoting behaviors inherent in wellness-centered care (Miller, 2009).

The hospitalization of older adults for acute illness is often associated with a decline in functional levels. Hospitals are the site where much of the health care for older adults is provided. The proportion of hospitalized patients who are elderly is estimated to increase, making the care of older adults an important focus of care for nurses working in an acute care setting. According to Landefeld (2003), older adults age 65 years and older are hospitalized nearly three times as frequently as younger persons. Acute care is a level of health care in which a patient is treated for a brief severe episode of illness (Graf, 2006). Hospitalization from an acute illness imposes a decline in functional status and is a predictor of risk for subsequent acute illness, nursing home placement or death.
Hospital admission can pose as one of the greatest threats to functional status in the older adult and interfere with recovery. Normal aging is associated with increased susceptibility to stressors. These changes may represent loss of reserve function. Functional decline may be the first sign of changing health status. Almost one-third of older adults admitted to acute medical-surgical units leave the hospital with a new impairment in their functional status (Hirsch, 1990). McVey and colleagues have also demonstrated that approximately one-third of veterans aged 75 and older develop a new disability in activities of daily living (ADL) after acute illness and hospitalization. These findings have been confirmed by other studies that document functional losses in mobility in hospitalized older patients (Hirsch et al., 1990; Inouye et al., 1993; Lamont et al., 1983; Warshaw et al., 1982). It is for these reasons this study focused on efforts to reduce the development of functional decline in hospitalized older adults. The key to preventing functional impairment lies in timely, ongoing, systemic assessment and intervention to detect risk and prevent adverse outcomes (St. Pierre, 1998). Research has demonstrated that functional loss is avoidable and nursing interventions can have a significant impact on preventing such decline (Graf, 2006). Reducing deterioration in the hospitalized older adult by increasing independence can make a significant impact in promoting functionality. Targeting functional status and supporting independence are important goals for hospitalized older adults.

**Background of the Study**

Low levels of mobility and bedrest are common occurrences during the hospitalization for the older adult. The phenomenon of bedrest and decreasing levels of
function has been an issue for over four decades. In 1960 the U.S. Public Health Service reported that disability from immobilization was one of ten preventable problems and could be reduced 50%-70% (Graf, 2006). Olson (1967) summarized the physiologic changes that occur in hospitalized patients when they undergo bedrest. The article described the detrimental effects of immobility on all body systems including physiological health. Creditor (1993) further explains the process leading to disability that occurs when a person has gone through normal aging changes and is hospitalized with bedrest. Even more is known about the hazards of immobility, yet the problem remains.

*Normal Aging Changes*

Aging causes loss of muscle fiber leading to a decrease in skeletal mass and strength (Graf, 2006). Older adults tend to have diminished mobility and the imposition of bedrest may further exacerbate the adverse effects of hospitalization. Low mobility and bedrest, critical risk factors for adverse outcomes, are common during hospitalization (Brown, Friedkin & Inouye, 2004). Patients assume bedrest during hospitalization to be a therapeutic necessity. It has been argued that older adults often leave the hospital less able to function than before they were admitted (Graf, 2006; Brown et al., 2004). Many older hospitalized patients are discharged in worse shape than before being admitted and many do not recover (King, 2006; Mallory, 2003). This may be attributed to bedrest during their hospital stay (Creditor, 1993; Graf, 2006). While in the hospital, older adults may be left immobilized in a bed or chair, quickly becoming de-conditioned (Creditor, 1993). The de-conditioning effects of acute inactivity (bedrest) have been studied extensively in younger healthy people as part of the American space program (Siebens,
Changes occur in coordination, muscle strength and balance. The loss of muscle strength may decrease protein synthesis (Deshenes, 2004). Creditor (1993) suggests lack of activity and exercise during hospitalization of older persons may contribute through the direct physiological effects of de-conditioning. The de-conditioning effects of acute illness are extrapolated from studies on acute inactivity, with a great deal of the information stemming from studies of young healthy persons put on bedrest in space programs and low gravity research. Recorded alterations include changes in mood, coordination, muscle strength, balance and work tolerance (Siebans et al., 2000). Immobilization of laboratory animals has been a model of de-conditioning investigation. Both of these types of investigations have provided many insights into the muscle, nerve, bone and cardiovascular system changes seen in people during an illness that are immobile. For older adults, mobility can be influenced by age-related changes. The bones, joints and muscles are the structures closely related to mobility. Normal changes in the musculoskeletal system are as follows: decreased muscle mass, degenerative changes in the joints, slower response of the central nervous system, and the development of osteoporosis (Kasper, 2003). As result of these changes, older adults experience muscle fatigue after short periods of exercise (Deshenes, 2004). Decreased physiologic reserve associated with normal aging predisposes hospitalized elders to functional decline. The age-related changes are taken into account in the Functional Consequences Theory (FCT) and are independent of the pathological condition (Miller, 2006).

**Ageism and Functional Decline**

Negative attitudes about aging that are held by health care workers can negatively affect the care older adults receive. Another risk factor for functional decline is
common perception that the disease process is associated to the aging process and conditions are irreversible. Therefore, conditions that can be treated effectively are not given attention they deserve. Acute hospitalization in older adults is associated with functional decline which can be prevented (Graf, 2006). Complications of hospitalization that result from imposed bedrest could be contributory to functional decline. Often health care providers may not encourage the older adult to walk, having the false notion that they may be frail and require rest. This leads to a cascade of dependency which hinders independence. It is important, therefore, that all health care workers who care for older adults understand that older adults strive toward improved levels of wellness and functioning.

Functional decline is defined as, the consequence of physiological changes of aging resulting in the inability to perform self-care activities independently or deterioration in self-care skills. (Graf, 2006; Palmer, 1995; Covinsky et al., 1997; King, 2006; St. Pierre, 1998). These self-care activities referred to as Activities of Daily Living (ADLs) include bathing, dressing, eating, toileting and transferring. In the literature, a range of terms is used to describe functional decline such as a loss of function, ADL decline, declining function, status decline, ADL status decline, declining function, status decline and functional impairment. Maintaining function is central to fostering health and independence in all older adults. An estimated 59% of adults with three or more ADL impairments will be admitted to a nursing home (Guralnik et al., 1994).

Functional decline in hospitalized older adults can have devastating consequences. Decline in functional status is a profound marker of morbidity and mortality. Hospital care is often focused on treating acute illness while functional status is
overlooked. Decline can happen quickly. Hirsch, et al. (1990) found that functional decline could occur as early as the second day of hospitalization. Once in the hospital, older adults have longer lengths of stay and are more likely to decline in functional status. (Creditor, 1993; Graf, 2006). Inouye, Bargardus, Baker, Leo-Summers and Cooney (2000) noted that 34%-50% of hospitalized older patients experience decline in their functional status between hospital admission and discharge. Effects of illness can precipitate further decline and ultimately prevent the older patient from living independently. A principal goal of the care of hospitalized older adults is to discharge patients at an improved or the same level of function prior to the onset of illness. They must maintain the ability to perform basic self-care activities. These ADLs are fundamental to maintain older people’s independence and quality of life. Functional status is dependent upon the ability of the older adult to perform ADLs independently.

A decline in any of the ADLs represents a change in physiologic or psychological function which can place an individual at risk of being institutionalized. Researchers have found that 25%-35% of older patients admitted to a hospital for medical illness lose independent function in at least one of the ADLs (Covinsky et al., 2000; Tucker, Molsberger, & Clark, 2004). Covinsky and colleagues (2000) reported that hospitalized patients’ assessment and their ability to perform ADLs before hospitalization have predictive validity of important health outcomes such as functioning and survival. In fact, Brown and colleagues (2004) concluded that hospitalization for older adults has been associated with declines in ADL status of 29% or more. Similarly, Inouye and colleagues (1993) demonstrated that functional measures are strong predictors of 90-day and two-year mortality after hospitalization. Fortinsky and colleagues (1999) determined how
changes in functional status during the two-week period before hospitalization and between hospitalization and discharge, influence the risk of nursing home admission in a large cohort of older adults living at home and hospitalized for acute conditions. A 2004 study of 1,147 adults in the U.S. ages 66 and older found that functional dependence significantly predicted later institutionalization (Callen, 2004). The results concluded that function status at the time of discharge is a key factor for nursing home admission or poor outcomes.

Research has shown that functional decline is not limited to the older hospitalized patients in the United States. A similar study in 2005 of 2,805 older adults in Australia found that severe physical impairment correlated with a 59% increase in nursing home placement (McCallum, 2005). Additionally, a hospital-based prospective study used a large group (950) in Brescia, Italy (Rozzini, Sabatini, Cassinadri, Boffelli, & Trabucci et al., 2005). Rozzini and colleagues tested the hypothesis that older ambulant patients who report functional decline between pre-illness baseline and hospital admission have a higher risk of nursing home placement and even death.

Theoretical Model

With people living longer, the U.S. is confronted with the major challenges of keeping people healthy throughout their lifespan. Otherwise they will be swamped with staggering health care costs that drain resources. Clearly the growing older adult population requires health promotion efforts. There is growing evidence that people are adopting beneficial health practices and living longer with fewer diseases and disabilities. More can be done in health promotion to produce a healthy older adult population. People who adopt healthful habits live not only longer but healthier, with less need and
demand for medical services. Those with detrimental health habits accumulate a lifetime of costly medical services and interventions. A life impaired by functional decline incurs heavy personal and social costs that must be factored into health promotion policies. Although older adults benefit as much from health promotion programs as do their younger counterparts, the older adults receive fewer preventive services. According to Grembroski and associates (1993), older adults with strong belief in their efficacy to manage health-related behavior take advantage of preventive services. They lower their health risk and achieve better health. Functional decline has more profound effects than simply decreased strength and stamina. It weakens the biological systems, resulting in negative changes in cellular and metabolic processes, loss in lean body mass. Functional decline due to bedrest can also be reversed or greatly attenuated by walking during hospitalization. Regular exercise provides a reliable means for improving health and extending quality of life. Despite the substantial health benefits of early ambulation, adults who have a low sense of self-regulated efficacy may not be able to adopt a regular walking regimen and adhere to it. Older adults decrease their activity during hospitalization believing in the inevitable and unchangeable status of their physical capabilities. By enhancing a sense of efficacy to regulate one’s motivation and health habits, Bandura’s Social Cognitive Theory can be applied to guide this study.

History

The Social Cognitive Theory (SCT) was developed by Albert Bandura in the early 1960’s. The theory stemmed from the Social Learning Theory (SLT) which has a historical background from the 1800s. SCT originated from the psychology discipline with a foundation from behavioral and social psychology. The SLT evolved under the
concept of behaviorism which explains why people and animals behave in a certain way. Also central to Bandura’s behaviorist study was the relationship between stimulus and response which determined the likelihood that learning would occur. Bandura (1977) led the efforts on cognitive (SLT) development. His theory focused on how children and adults operate cognitively on their social experiences, thereby influencing behavior and development. Bandura’s theory was the first to incorporate modeling as a form of social learning. Additionally, Bandura introduced several important concepts such as self-efficacy, reciprocal determinism and the idea that a significant lapse of time can exist between cause and effect. In 1986, Bandura renamed the SLT to the SCT to further distance his theory from the behaviorist approach. Bandura’s most recent work has been redirected from developmental psychology to the field of health psychology.

Purpose of Theory

According to Bandura (1977) the purposes of the SCT are to understand and predict individual and group behavior, to identify methods in which behavior can be modified or changed, and to apply interventions aimed at personality development, behavior pathology and health promotion.

Overview

The Social Cognitive Theory (SCT) views people as neither driven by inner forces nor automatically controlled by external stimuli. The individual is thoroughly integrated in the environment in which the individual is learning a behavioral change. The individual’s cognitive responses, behaviors and environment work together to create a behavioral change. The individual (learner) observes models and build self-efficacy. Self-efficacy is the belief that an individual has the capability to accomplish the behavior
modeled. Based on the individual’s understanding of the importance of this modeled behavior, the individual will then self-regulate the behavior and become proactive to gain mastery for a positive outcome. Human functioning is explained in a model of triadic reciprocity in which behavior, cognitive and environmental events all operate as interacting determinants of each other (Bandura 1977). The term reciprocal refers to the mutual action between causal factors. Reciprocity does not mean symmetry in the strength of bidirectional influences. Nor is the strength of mutual influences fixed in reciprocal causation. The influence of the three interacting factors will vary for different activities, individuals and circumstances. An example of this would be an older adult who walks daily for enjoyment. Such behavior is self-regulated by its cardiovascular effects, whereas the cognitive activities and situational influences are involved to a lesser extent in the process. When situational constraints are weak, personal factors serve as the predominant influence in the regulatory system. The development and activation of the three sets of interacting factors are all highly independent. The triadic factors do not operate simultaneously as a whole entity. Therefore it is possible to understand how different segments of two-way causation operate. This can be applied to the case of physiologic functioning, where the subsystems are closely related and the time for reciprocal action is much shorter. Bandura (1986) researched extensively the interactive relationship between thought and action. He examined how conceptions, beliefs, self-perceptions and intentions shape behavior. What people think, believe and feel affects how they behave. In other words individuals have a self-regulating function with the capability to alter their environments and influence their own actions. When considering the reciprocity between the person and the environment, the environment influences can
affect individuals apart from their behavior. Individuals evoke different reactions from their social environment by their physical characteristics such as age, race and gender. People activate different reactions based on their social roles and status. If an older adult perceives him or herself as having a low status based on age, the individual may not elicit accommodating reactions to the social environment. The social reactions affect the recipients’ conception of themselves that either strengthen or reduce the environmental bias. The nature of persons is defined within this perspective in terms of a number of basic capabilities (Bandura, 1977).

Bandura was guided by various psychosocial theories of human behavior of how cognitive and social factors contribute to human health and disease. In SCT, normative influences regulate two behavior systems: social sanctions and self sanctions. Social norms influence behavior by the consequences they provide. Behavior that violates social norm has negative consequences whereas behavior that fulfills socially-valued norms is rewarded. One does not act solely on the basis of anticipated social sanctions; rather the individual adopts certain standards of behavior and regulates their actions through self-evaluative consequences the person creates. Social norms convey standards of conduct. Bandura (1986) believes people behave in ways that brings them self-satisfaction. They refrain from behaving in ways that violates their standards due to self-censure.

In the SCT, cognitive goals rooted in a value system provide further self-incentives and guides to health behavior. Goals are an interlinked facet of a motivational mechanism that operates through self-monitoring, aspiration standards and affective self-reaction. Efficacy beliefs affect goal setting whether or not substandard performances spark greater effort. Bandura (1986) imparts that goals make an independent contribution
to performance. However, personal change would be easy in the prevention of bedrest, if there were no barriers to surmount. SCT distinguishes between different types of barriers: cognitive, situational, or structural. These barriers such as ageism, environment and lack of mobility orders are important factors in the SCT. The regulation of health behavior is not solely a psychological issue. Some impediments to health promotional practices reside in the health system rather than in cognitive or situational impediments. Some of the barriers are conditions that impede performance of the health behavior, which is an integral part of self-efficacy assessment. Efficacy beliefs must be measured against barriers or impediments to successful performance. In the case of a walking regimen, older adults judge the strength of their capabilities to get themselves to walk regularly despite a variety of situational, social, and personal hindrances. Thus in SCT, the multifaceted construct of perceived health barriers is differentiated into three major forms: (a) perceived self-efficacy to surmount obstacles and maintain healthy habits, (b) negative expected outcomes related to lifestyle changes, and (c) unavailability of health resources. Most of the models of health behavior are concerned mainly with predicting health habits but offer little guidance on how to change them. The SCT embeds the sociocognitive determinants in a large body of knowledge that specifies their origins, the processes through which they produce their effects, and how to modify them to enhance human health (Bandura, 1986). This in turn provides a unified conceptual framework. The SCT offers both predictive and operative power and has greater utility than one that is limited to prediction. Self-efficacy is considered to be one of the most consistent predictors of exercise adherence. Self-efficacy refers to the extent to which an individual believes they are capable of carrying out a behavior. According to Bandura's (1986) theory, increasing
self-efficacy will lead to increased resources such as effort and time being devoted to the
task. Self-efficacy reflects control perceptions and is now incorporated in most theoretical
approaches to predicting health behavior.

Effective self-regulation is not achieved through an act of will. It requires the
development of self-regulatory skills. There are three primary strategies for self-
regulation development: Goal Setting, Planning and Persistence. Individuals must
develop these strategies for regulating their own motivation and behavior to build a sense
of controlling efficacy. They must learn how to monitor the behavior they seek to change,
set short range attainable sub-goals, and enlist positive incentives and social support.
Once empowered by the skills and beliefs in their capabilities, individuals are better able
to adopt behaviors that promote health and eliminate those that hinder or impair it. They
then benefit more from treatments to prevent functional decline, such as an ambulation
program. The impact of therapeutic interventions on health behavior is partly mediated
by the effect of efficacy beliefs. The stronger the efficacy beliefs the intervention instills,
the more likely that individuals sustain the level of effort needed to adopt and maintain
health-promoting behavior. Accurate appraisal of one’s own capabilities is essential for
effective functioning.

Usefulness of Theory in a Structured Ambulatory Program

What emerges from the literature review of functional decline is that the health
care providers must take into account the relationships between disease, age-related
changes and the environment. The important indicators of age are the ability to function
and participate in desirable activities. Once in the hospital, older adults have longer
lengths of stay and are more likely to decline in functional status. (Creditor, 1993; Graf,
Creditor and Graf implicitly incorporated the SCT in their research by addressing the care of the older adult based on efficacy and self-regulatory capability. The role of health care professionals working with older adults in health promotion intervention is to lead and support the older adult through the stages of change with health-promoting behaviors.

**Additional Theoretical Models**

Although limited by small sample size (39 patients), Mallery (2003) conducted a randomized controlled trial involving resistance exercise with acutely-ill, hospitalized patients. The primary outcomes were adherence and participation. Similarly, Sieban et al. (2000) conducted a trial of low intensity exercise and walking which showed no effect on hospital length of stay and minimal functional impact.

Inouye, et al. (2000) noted that 34%-50% of hospitalized older patients experience decline in their functional status between hospital admission and discharge. Inouye and colleagues incorporated the Person-Environment Fit Theory (Lawton, 1982) which considers the interrelationship between personal competence and the environment. Functional competence is affected by multiple intrapersonal conditions such as ego strength, motor skills, biological health, cognitive capacity and sensoriperceptual capacity and the external conditions posed by the environment. A person’s ability to meet environmental demands is correlated to their level of function and influences their ability to adapt to the environment. The environment is viewed in terms of its potential for eliciting a behavioral response from the person. Concepts from the theory help the health clinician to appreciate the importance of environmental adaptations and behavior change as interventions to improve functional status.
**Education and Support**

Intervention to increase patient’s mobility involves providing sufficient patient support and education. This researcher produced an educational video which discusses the benefits of ambulation, the hazards of functional decline, and the use of assistive devices as appropriate. The video stressed the importance of family involvement and maintaining a routine schedule.

Positive functional consequences can result from purposeful interventions. Positive functional consequences (Wellness Outcomes) are evaluated by the degree in which the older adult achieves and maintains the highest possible level of independence and being discharged to their pre-morbid functional level. The FCT was used to create an assessment tool for the early detection of hospitalized older adults experiencing acute confusion to prevent further complications (Kozak-Campbell & Hughes, 1996). A case study was written to illustrate the application of the (FCT) in clinical practice. By assessing change in behavior, the nurses were able to identify depression, delirium versus dementia. Kozak-Campbell and Hughes utilized the theory’s context of risk factors for acute confusion and were able to assess them into three categories. The three categories were: psychological functioning, psychosocial functioning and comfort pleasure factors. Nurses were able to distinguish the interrelationship between age-related changes and the risk factors of the three categories that result in acute confusion with the hospitalized older adults. Although the theory was applied successfully in the previous example for hospitalized patients with acute confusion, there is no known literature that names the theory explicitly. Miller (2009) states that the theory can be applied in all settings which involve older adults; however, it was only tested in a hospital clinical setting. The theory
needs to be tested in a long-term care facility, an elder day care, and an assisted living facility. The theory is fairly new and is specific to older adults so therefore it could not be applied to the younger adult that may experience functional decline.

*Problem Statement*

As a certified geriatric resource nurse and a Gerontologic Nurse Practitioner, this researcher has noticed increasing decline in functional levels in hospitalized patients she has cared for which is considered the leading complication of hospitalized older adults. Older patients are being discharged with worse baseline function than admitted. Research has shown that functional decline loss is avoidable and nursing care can have a significant impact on preventing decline. There is evidence in the literature that exercise improves the health and wellbeing of older adults. Little is known, however, of the relationship between exercise and functional levels. Interventions such as mobilization to prevent decline can have an impact on improving outcomes for the hospitalized older adult. Therefore, the focus of this study is on the effectiveness of a structured walking program in hospitalized older adults who are ambulatory.

*Research Question*

What are the effects of a structured mobility program on functional levels in hospitalized older adults as measured by the HARP assessment and length of stay?

In addition this study explored:

- Does age play a factor on functional levels?
- Does pre-hospitalized condition affect functional levels?
  
  The goal of the study aims to investigate:

- Reducing the adverse effects of immobility.
• Maintaining functional independence.

• Preventing an increase in length of stay (LOS).

Definitions of Key Terms

For the purposes of this study, the following operational definitions were used:

Activities of Daily Living (ADLs) – For the purposes of this study the ADLs of interest are those that are assessed by the HARP scale. ADLs are the ability to meet one’s basic needs independently. The six ADLs are toileting, feeding, dressing, grooming, bathing, and ambulation.

Age-Related Changes – Inevitable, progressive, and irreversible changes that occur during later adulthood and are independent of extrinsic or pathologic conditions.

Atrophy – loss of maximum force generation, change in type of density of muscle fibers.

Chronic de-conditioning – changes are occurring over months and years.

De-conditioning – the multiple changes in organ system physiology that are induced by inactivity and preserved by activity. In the clinical setting, de-conditioning refers to changes that occur within days or a few weeks of a sudden decrease in physical activity.

Early Ambulation – to accelerate the patients’ ability to walk or move about. Rapid mobilization than is normally practiced.

Efficacy – Beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainment (Bandura, 1998, p. 3).
Functional assessment – refers to the HARP assessment tool; taking age into account it evaluates a hospitalized older adult’s ability to fulfill responsibilities and perform self-care tasks and categorizes them according to risk for functional decline.

Functional consequences – observable effects of actions, risk factors, and age-related changes that influence the quality of life or day-to-day activities of older adults.

Functional decline – the consequence of physiological changes of aging resulting in the inability to perform self-care activities independently or deterioration in self-care skills. (Graf, 2006; Palmer, 1995; Covinsky et al., 1997; King, 2006; St. Pierre, 1998).

Health – the ability of older adults to function at their highest capacity, despite the presence of age-related changes and risk factors.

Iatrogenic – “any illness resulting from a diagnostic procedure or from any form of therapy or a harmful event that is not a natural consequence of the patient’s disease” (Palmer, 1995, p.119).

Mobility – is a multifaceted and relative concept. In measuring walking distance and ability to stand from a chair a practical view of mobility is evidenced. This operational definition of mobility is consistent with other authors’ measurement of mobility in the elderly (Schoenfelder, 2000).

Nursing – the focus of nursing care is to minimize the negative effects of age-related changes and risk factors and to promote wellness outcomes.

Older adult – refers to a person that is chronologically 65 years old or older. A complex and unique individual whose functioning and well-being are influenced by the acquisition of age-related changes and risk factors.
Risk factors – conditions that increase the vulnerability of older adults to negative functional consequences.

*The Professional Significance of the Study*

The professional significance of the study is to increase awareness of the effect of immobility in hospitalized older adults. An early assessment of the functional prognosis of hospitalized older adults may help to target patients who will benefit from mobility intervention. This could lead to standard policy of health care providers and nurses addressing specific activity orders. Hospital-wide programs that are focused on recovery and prevention for older adults need to be developed and supported.

Acute illness and hospitalization often precipitate loss of ADL function in older people in spite of treatment for acute illness. Hospitalized patients may have several days when they do not perform their own ADLs and may not recognize the deterioration that has occurred. The many causes of functional decline among hospitalized older adults are all iatrogenic. Decreased mobility secondary to the underlying disease or its treatment is an iatrogenic effect of hospitalization. Palmer (1995) describes iatrogenic illness as “any illness resulting from a diagnostic procedure or from any form of therapy, or a harmful event that is not a natural consequence of the patient’s disease” (p.119). This includes the illness itself, medical and surgical treatments and the de-conditioning effects associated with bedrest (Palmer, 1995; Graf, 2006; Hirsh et al., 1990). Iatrogenic complications occur in 29%-38% older hospitalized patients, a rate three to five times higher than in younger adults (Creditor, 1993). Older adult patients are likely to have multiple chronic conditions, physiologic impairment, decreased reserve and many medications that make them vulnerable to the adverse effects of hospitalization. Although age-related changes
increase one’s vulnerability to functional impairments, these disabilities can be attributed to risk factors such as diseases and adverse medication effects. Many aspects of hospitalization are detrimental to older adults and may include prolonged bedrest and immobility, adverse drug events, malnutrition, pressure ulcers, delirium and nosocomial infections. (Mobily & Skemp, 1991). Iatrogenic effects of treatment also are seen in the abduction of pillows that splint legs after hip surgery to maintain the position of a new prosthesis resulting in weakened leg muscles and preventing mobility. The inability to transfer from bed to chair, falls, incontinence and confusion are factors that limit the ability to return to independent living after hospitalization. The contributors of functional decline are numerous and interdependent. However, many are amenable to simple nursing tasks such as increasing patient’s mobility. Graf (2006) states that the hospital environment is not elder-friendly and contributes to functional decline. Care is often scheduled according to staff’s needs and routines. Older adults are tethered with intravenous lines, indwelling urinary catheters and drains. Additionally, hospital beds are higher than their bed at home, and hospital floors may be waxed resulting in a glare. Often times these environmental barriers can prevent the older adults from walking because of fear of falling. As a result, older adults may remain sedentary during hospitalization.

*The Effects of Bedrest and Immobility*

Low mobility and bedrest are common occurrences during hospitalization. Although bedrest can be restorative in illness, it also has deleterious consequences for the older adult patients. Complications of immobility have been well described in the literature. The harmful effects of immobility are based primarily on studies of young
healthy subjects. These studies have demonstrated that the supine position and immobilization affect nearly every body system. Recent reviews suggest lack of physical activity and exercises during hospitalization contribute to the effect of de-conditioning. Numerous studies have found a significant association between bedrest and functional outcomes (Corcoran, 1991; DeMorton, Keating & Jeffs, 2007; Harper & Lyles, 1988; Mobily & Kelly, 1991; and St. Pierre, 1998). Gulranik and colleagues (1995) concluded that lower extremity strength itself is a significant predictor of mortality independent of ADL score. Kasper (2003) theorized that an older adult may lose the ability to restore skeletal muscle mass through repeated cycles of atrophy and recovery. The loss of strength and muscle mass begins within 24 hours and can occur at a rate of 1% to 1.5% per day (Palmer, 1995). An estimated 16%-33% of older adults are on complete bedrest during hospitalization (Brown, Friedkin, & Inouye, 2004). Bedrest diminishes muscle mass and strength, diminishes lung function and decreases aerobic capacity which occurs with aging (Graf, 2006; Harper & Lyles, 1988; Palmer, 1995).

Immobility places an older adult at greater risk for falls. Falls are the primary reason for injuries in older adults. Complications from falls are found to be the leading cause of death in adults age 65 and older (Lyons, Johnston, Covinsky & Resnick, 2002). Brown, et al. (2004) conducted a prospective cohort study to predict functional outcomes of 498 hospitalized patients aged 70 or older from scored mobility levels of these patients. They demonstrated that low mobility is an independent predictor for adverse hospital outcomes and functional decline. Likewise, Creditor (1993) found the most predictable and probably most preventable cause of functional decline is de-conditioning from bedrest and reduced mobility.
Summary of Remaining Chapters

Functional status is a significant component of older adults’ health status and quality of life. Mobility and ambulation are vital to maintaining functional status. Mobility forms the foundation of continued independence, health and encompasses behaviors necessary to actively engage in activities of daily living. However research has demonstrated that low mobility and bedrest are common during hospitalization. Hospitalization often results in complications that lead to functional decline in older adults. Impairment in functional status is a strong predictor of poor outcomes. Chapter 2 provides a review of the literature pertaining to functional decline in hospitalized older adults, analysis, gaps and recommendations for further studies. Chapter 3 focuses on the research design, participants, context, instrument for data collection and data analysis. Research results are presented in Chapter 4 as it pertains to demographic findings and the research hypothesis. Chapter 5 presents discussion, implications of findings, limitations, recommendations and conclusions based on the study’s findings.
Chapter 2: Review of the Literature

Introduction

Historically many studies have examined the effect of an exercise regimen on frail older residents in skilled nursing facilities in terms of psychological, cognitive and physical outcomes. However, for the purposes of this study, only those that investigate mobility or functional ability are discussed. Interventions to increase a patient’s mobility involve providing sufficient support and education. Positive functional consequences can result from purposeful interventions. Positive functional consequences (Wellness Outcomes) are evaluated by the degree to which an older adult achieves and maintains the highest possible level of independence while hospitalized and is discharged at their pre-morbid functional level (Miller, 2006).

Research on Aging and Functional Decline

There are several studies that were conducted to increase mobility and exercise to prevent functional decline. Tucker, Molsberger and Clark (2004) have shown that walking older patients during hospitalization is an effective means of combating decline. Tucker et al. (2004) developed a six-month pilot entitled Walking for Wellness program to test the feasibility of a daily walking program. Trained escorts assisted patients with hallway ambulation two to three times per day. The program improved the implementation of physician-ordered activity and linked patients and families with other walking opportunities during hospital and after discharge. Bandura’s (1986) social-cognitive theory (SCT) was used as the theoretical framework to understand and predict
exercise behavior. Similarly, Umstattd and Hallam (2007) applied Bandura’s theoretical framework and examined three variables: self-efficacy, self-regulation and outcome expectancy value to predict exercise behavior in older adults. A strong body of literature exists to support the contention that self-efficacy in relation to a particular task or challenge is positively correlated with actual performance of that risk or challenge in the real life group setting. Gilliss and colleagues (1993) measured, among other variables, self-efficacy expectations and actual behavior outcomes after a low intensity psycho-educational nursing intervention during recovery from cardiac surgery. Their psycho-educational nursing intervention was aimed at advanced patient outcome in walking, mood, and quality of life measures. They found that self-efficacy with respect to walking and actual walking behaviors were the only outcomes in which they were able to demonstrate a clear and significant benefit.

Convertino (1997) reviewed a wide range of biological changes commonly attributed to the aging process and noted their close similarity to changes that occur subsequent to a period of enforced physical inactivity. He concluded that there were no drugs currently that held as much promise for sustained health as a lifetime program of physical exercise.

Based on the result of previous research, an interdisciplinary approach to the design and implementation of a mobility regimen may offer the promise of improving functional outcomes for hospitalized older adults. Long hospitalizations, exercise intolerance and impaired ambulation contribute to an older patient’s immobility. Early and frequent mobilization is indicated to counteract adverse effects of immobility. Innovative hospital- based programs such as walking regimens aimed at preventing
functional decline and promoting self-care are being initiated. Wanich, Sullivan-Marx, Gottlieb and Johnson (1992) found that when nurses initiated mobility interventions during hospitalization, older patients were three times less likely to decline in their functional status. Mobility regimens may offer the promise of improving functional outcomes among hospitalized older adults. Tucker et al. (2004) have shown that walking older patients during hospitalization is an effective means of combating decline. Tucker et al. developed a six-month pilot entitled Walking for Wellness program to test the feasibility of a daily walking program. Trained escorts assisted patients with hallway ambulation two to three times per day. The program improved the implementation of physician-ordered activity and linked patients and families with other walking opportunities during hospitalization and at discharge. Likewise, Mallery (2003) conducted a randomized controlled trial involving resistance exercises with acutely ill hospitalized patients, however limited by small sample size (39 patients). The primary outcomes were adherence and participation. On the other hand, Sieban et al. (2000) conducted a trial of low intensity exercise and walking which showed no effect on hospital length of stay and minimal functional impact. Further investigation is needed on the effect of walking regimens to prevent functional decline. To substantiate Creditor’s (1993) claim of the deleterious effects of bedrest, Bloomberg (1997, p. 198) contends that simply reducing normal activity represents the first element in a “spectrum of disuse”. Bloomberg addressed the various models used by researchers to study disuse which induces changes in muscle and bone observed during prolonged bedrest in humans. Data from these models were used to illustrate the magnitude and time course of alteration in muscle and bone disuse following a prolonged bedrest (> 5 days). Data were obtained
from studies of human subjects during a fifteen-year period. Bloomberg researched the study by Deitrick and colleagues who studied four young males subjected to bedrest and lower body immobilization with waist to toe casts. The data revealed a significant increase in urinary nitrogen excretion by the fifth day. These data reflect the increased protein degradation of immobilization which is consistent in animal models. This negative nitrogen balance is an early marker for the dramatic muscle atrophy that will occur even in the healthiest individual if bedrest is prolonged. Additionally, Bloomberg investigated a four-week unilateral lower limb suspension which resulted in a 7% decrease in muscle cross-sectional area at mid-thigh with no changes noted in the contra-lateral limb muscle. Similarly data from several American and Soviet bedrest studies demonstrate a positive relationship between the duration of bedrest and the decrease in muscle strength. Periods of bedrest due to illness must be limited to as short duration as possible. In many cases Bloomberg (1997) discovered that bedrest de-conditioning can be exacerbated by pre-existing conditions; such as severe osteopenia in hip fracture patients which is certainly worsened with prolonged immobilization during recovery. This will leave a patient more at risk for fractures with remobilization after prolonged bedrest due to the slower time of recovery of bone mass relative to muscle mass. This is alarming for the older hospitalized adults who may be prone to bedrest with little bone or muscle mass to spare.

Acute hospitalization in older persons is associated with functional decline that is not readily explained. Previous reviews suggest lack of physical activity and exercise during hospitalization may contribute to such decline. Siebens and colleagues (2000) evaluated whether increased exercise in hospital and afterward would shorten length of
stay and improve physical function. The study design was a randomized controlled trial of an exercise program at Cedars-Sinai Medical Center 700-bed, community-based teaching hospital. Participants were randomized after initial chart review and interview. The participants were then placed into one of four groups based on Diagnostic Related Groups (DRG) and co-morbidities: (1) short DRG, low co-morbidity, (2) short DRG, high co-morbidity, (3) long DRG, low co-morbidity, and (4) long DRG, high co-morbidity. The exercise program included a hospital component and a self-administered one-month home component. The participants were three hundred patients aged 70 and older (mean age 78.2 years ± 5.60) with non-disabling medical and surgical diagnoses who are admitted to an acute care hospital between December 1990 and April 1992. The inclusion criteria were: patients that had an expected length of stay of five days or more were ambulatory before admission, and were not expected to die within 12 months. The intervention patients were screened within two-to-three days of admission by a physical therapist. The exercise program consisted of 12 exercises for flexibility, strengthening, and a walking regimen which were performed twice daily. The exercises were performed once with a physical therapy aide and once independently by the patient and three times a week at home. In addition to the exercises several interventions were used to encourage learning of and adherence to the exercise program based on two adult education approaches. There were no significant differences between the control group (n=151) and intervention group (n=149) in basic demographics, general health status, and functional baseline. The control patients received usual hospital care. The patients were not blinded to the interventions, however in the one-month data collection the telephone interviewer was blinded as to which group the patients were in. Multiple covariates were measured to
assist in isolating the effect of exercise from the known effects of age, co-morbidity and
gender on function in the older adults. General self-rated health was measured through
the RAND General Health Scale. To control for burden of co-morbid illness, patients
were classified as either low or high co-morbidity, based on information obtained through
interview. The primary outcome measure was hospital length of stay. Functional
measures at one month after discharge were obtained through telephone interviews. The
results indicated that the exercise program did not shorten length of stay between the
intervention and the control group, but the direction of effect shows a trend in favor of
the treatment group. However, the intervention results did improve functional outcome in
instrumental activities of daily living (beta=.433 (95% CI, 0.044-0.842) after one month.

Since definitive studies were not available in the literature to determine what type
of physical activity will prevent functional decline in hospitalized older adults, Mallery
and colleagues (2003) researched the feasibility of performing resistant exercises with
acutely-ill, hospitalized older adults. Their hypothesis stated that strengthening exercises
may prevent de-conditioning and Pilates exercises may promote safety. The researchers
developed a set of resistance exercises that can be performed in bed with emphasis of
providing enough resistance to the major muscle groups of the lower extremities. The
goal was to measure the adherence to the exercise. A randomized controlled trial
recruited subjects from the geriatric, internal and family medicine wards at the Queen
Elizabeth II Health Sciences Center, a tertiary care, university hospital in Halifax, Nova
Scotia. Patients received either resistance exercise or passive range of motion (ROM)
exercises (control group). The ethic committee approved the study protocol. All
participants and their family members provided written consent for participation.
Participants were randomized in a 1:1 ratio in blocks of 8. Participants included thirty-nine patients (control=20, intervention=19), recently admitted to an acute care setting over the age of 70 (mean age =82, SD=7.3) and ambulatory prior to admission. Additionally, participants had to be able to follow a three-step command on the Folstein Mini Mental State Exam (MMSE). Both control and exercise groups received usual hospital care. Participants exercised three times a week with assistance from a physiotherapist for 30-40 minutes with a rest day in between sessions. The control group performed six range of motion exercises for the lower extremities, also aided by the physiotherapist. Participants exercised until discharge. The primary outcome measures were participation and adherence. Descriptive statistics were calculated for all variables and between group comparisons were tested using the Mann-Whitney U test and Fisher’s extract test (p<.05). The results demonstrated participation was 71% (p=0.004) and adherence was 63% for the resistant exercise group. Participation and adherence for ROM exercise was 96% and 95% respectively. This result indicates that resistance exercise can be difficult for some acutely ill hospitalized older adults. Adherence and participation with exercise were not significantly different for those participants with cognitive impairment compared to those without cognitive impairment, indicating that dementia of mild to moderate severity is not a major obstacle for performing resistant exercises.

Similar to the work done by Mallery and colleagues (2003) on resistance training, Fahlman and colleagues (2007) wanted to determine whether resistance training or combination resistance training and aerobic training resulted in the most improvement in measures of functional ability in functionally-limited older adults. The study took place at
a university located in a large mid-western city. The participants were community dwelling older adults who experienced some limitation in functional ability but were well enough to exercise three days a week. Participants answered 10 physical function questions of the Medical Outcomes Study Short Form via telephone interview. Participants who scored 24 or less out of 30 were eligible to participate. Those who met enrollment criteria received additional screening, which included an exercise electrocardiogram, and a physical examination by a medical doctor. Those who were medically cleared were randomly assigned into one of three groups: combination training (CT), resistance training (RT), or a control group. All participants were required to sign an informed consent, and approval was obtained from the university’s human subject review board. The CT group’s exercise began with a 10-minute period of aerobic walking in week one and was gradually increased by four minutes each week to a total of 20 minutes. Additional resistance training was introduced in week one with a gradual increase in repetitions to a goal of two sets of 12 repetitions of 13 resistance training exercises. Participants used Thera-Band resistance bands and selected the color that provided sufficient resistance to produce mild fatigue. The colors of the bands were dependent upon strength and were coded 1-7 for statistical analysis. For the RT group, weeks 1 and 2 consisted of one set of 10 repetitions and were gradually increased to two sets of 12 repetitions of the same exercise used by the CT group. The control group was given no intervention; however they were instructed to not change the amount of activity they were currently undertaking. As an incentive to remain in the study the control group was offered supervised training at the completion of the 16-week study. The dependent variables were analyzed separately using a three-group (CT vs. RT vs. C) x three-time
(baseline vs. mid vs. post) analysis of variance with repeated measures on the second factor. All statistical decisions were based on alpha=.05. A post hoc analysis of significant effects was performed using Tukey’s procedure. The most promising results from this study are that both exercise groups increased some measures of functional ability as well as strength and endurance. This exercise intervention can be easily performed in the home and can be a contributor for retarding age-related decline. This is important for reducing morbidity, mortality and maintaining independence in the later years.

To prevent decline in older hospitalized patients from immobility, Tucker and colleagues (2004) piloted a Walking for Wellness program. The program was designed to educate older patients about remaining mobile with the assistance of trained staff. The purpose of the study was to address an exercise option for hospitalized patients who did not meet the requirement for chargeable physical therapy. The study took place at Piedmont Hospital, a 500-bed, general and acute care, not-for-profit hospital in Atlanta, Georgia. The hospital provided funds to support a six-month pilot program. The Risk Management Department reviewed and approved the program’s policies and procedures. The program included the use of trained escorts to assist with walking several times a day. The escorts were trained on the proper technique and safety of walking with a seven-minute video produced by the coordinator and the physical therapist. Seventy–two patients were recruited to the program. Participants were identified through medical chart review. Patients considered were greater than 64 years old, ambulated before admission, and were not candidates for physical therapy. Physician approval was obtained through a written request. Markers were place every 10 feet at the baseboard of the hallway to
measure walking distance and to provide incentive for the participants. After one full day of participation and before discharge, the coordinator surveyed the patient and family members to ascertain satisfaction. At discharge patients received brochures for additional exercise opportunities at the hospital’s health and fitness club. Of the 103 identified, 72 (70%) received approval orders. Most of the participants were women (65%) with a median age of 80 years old. Participants spent on average 2.36 days in the program with an average of 5.63 walks per patient. Satisfaction surveys indicated 100% satisfaction rate with recommendations of lowering the age requirements so all hospitalized patients can participate.

In an effort to document and compare the frequency of walking in hospitalized older adults, Callen and colleagues (2004) conducted an observational time sample study. The setting was in the hallways of three medical units of a 485-bed academic care center. Each unit was observed weekdays for eight three-hour intervals covering 8AM to 8PM. Of 118 patients age 55 or greater considered by nurses as ambulatory, 18.6% walked once, 5.1% twice, 3.4% more than twice, and 72.9% did not walk at all per three hour period. The median minutes were 5.5. The sample for analysis was walking performed by patients. Continuous data were evaluated for normal distribution. Data that were not normally distributed were summarized by median and ranges, and comparisons between groups were performed using Mann-Whitney or Kruskal-Wallis. Categorical data were compared by Fisher exact test for two groups and Pearson chi-square test for more than two non-ordered groups. All data were tested for across unit differences. Level of significance was set at .05, and all tests were two-tailed. Informed consent was not obtained because no data for individuals and no identifying information were obtained.
The results revealed that the amount of walking was low both for patients considered able to walk independently and those needing assistance, with no significant difference between these groups. Callen and colleagues speculate that the potentially reversible reason for insufficient walking may be lack of emphasis on the benefits of ambulation by physician, nurses and other hospital staff. Unpublished data from a hospital in New South Wales lends further support. This program was associated with the integrated bed management strategy initiative provided for under the federally funded National Demonstration Hospitals program (Collins, 1999). The program consisted of providing an extra two walks per day, seven days a week for those patients whose discharge might be delayed due to immobility. It appears to have been successful in facilitating discharge for the group of patients that required a period of mobilization once their acute medical condition was under control. The reduced length of stay for this group of patients enabled the organization to consider closing up six rehabilitation beds and focus more resources on the more dependent patients.

Previous research has validated that functional status change occurs with hospitalization (Graf, 2006; Creditor, 1993; & Covinsky et al., 2003). Wakefield and Holman (2007) conducted a study to describe functional trajectories in hospitalized older patients and identified risk factors associated with the trajectories. Few studies have assessed social activities, functional decline at admission, depression or visual impairment which are all potentially prognostic variables (McCusker et al., 2002). Their study attempted to address the gaps to assess how functional status changes prior and during hospitalization. The three research questions that were investigated were: What is the prevalence of functional status limitation on admission to the hospital? How does
functional status change prior to and during hospitalization? What risk factors are associated with functional status changes before and during hospitalization? The study employed a prospective observational cohort design. The study took place at the Iowa Affairs Medical Center, a 136-bed tertiary care referral center affiliated with the University of Iowa. Patients 65 and older were screened who were admitted to two general medicine units during an 18-month period. Patients were excluded if they were unable to participate based on chart documentation of dementia, confusion, or recent mental status change or length of stay was 48 hours or less. Patients were enrolled in the study within 48 hours of admission. After obtaining an informed consent, data were collected on demographics, risk factors and baseline status. The initial assessment included the ADLs (two weeks prior to admission and at the time of enrollment) and Acute Confusion (AC) assessments (at the time of enrollment). Follow up assessments were performed on Day 4 of their hospital stay on all respondents. The primary outcomes of interest were physical and cognitive function. Physical function was defined as ADLs and measured using self-patient report. Respondents were classified as independent if they were independent with or without assistive devices (walker, canes). Respondents scored one point for each ADL dependency, thus score ranged from 0-13, with higher scores reflecting greater dependency. AC was assessed using two validated instruments: the Confusion Assessment Method CAM (Inouye, 1990) and NEECHUM Confusion Scale (Neelon, Champagne, Carlson & Funk). Functional status change was defined as any change in ADL occurring during the two weeks before hospitalization, or from Day 4 of hospitalization, or the development of AC during the first four days of the hospital stay. Risk factors were defined as demographic, physical, cognitive, psychosocial and
biomedical factors that were present on admission and associated with functional decline during hospitalization. Vision was tested using a hand-held Snellen chart and was considered impaired if the respondent had worse than 20/40 corrected vision. Hearing was tested using a free-field voice testing and was considered impaired if the respondent heard correctly six or fewer of 12 numbers whispered in each ear from a distance of 24 inches. The MMSE was used as a general screen and used responses in scoring the NEECHAM. Patient scores of 18 (out of a 30) or higher were included in the current study. In the MMSE, alpha levels for internal consistency ranged from .54 to .96; test-retest reliability coefficients range from .80 to .95 for cognitively intact and impaired patients. Depression was measured using the Geriatric Depression Scale (GDS; Brink, 1983). The scale demonstrated a high degree of internal consistency (Cronbach’s alpha= .94) and test-retest reliability (r=.85) on respondents tested less than a week apart. Using a cut off score of 11 yielded a sensitivity of 80% and specificity of 95%. A more stringent cut off score of 14 yielded a sensitivity of 80% and a specificity of 100%. Therefore scores 0-10 were considered normal, scores 11-20 indicated greater possibility for depression, scores 21-30 indicated severe depression. Social support was scored as the self-reported number of contacts that respondents had with family and friends per month. This included contacts made in person or via the telephone or email. The presence of pressure ulcers was measured by direct observation of skin breakdown using the four staging system. All data were entered using the double data entry verification and analyzed using the Statistical Analysis System. Student’s t test was used for continuous level variables. Chi square or Fisher’s exact data were used for categorical data. Of the 574 patients that were screened only 71 enrolled in the study. Approximately half of the
screened population was younger than 54 years. The sample of patients was older with no pressure ulcer on admission. On the first question investigating the prevalence of functional limitation on admission, respondents averaged 2.4 (SD=3.3) ADL limitations. No respondent was acutely confused or developed AC during the data collecting period. The second question regarding the change of functional levels before and during hospitalization, respondents reported having a mean of .58 (SD=1.7) dependencies in ADLs at baseline (two weeks before admission). The figure grew to an average of 2.4 (SD=3.3) dependencies on admission and remained steady through hospital Day 4. This sample experienced far greater decline in ADL function from baseline to hospital admission (mean change of 1.82) than it did during the first four days of hospitalization. A small decline was noted in the NEECHAM score from admission to hospital Day 4, which was not statistically significant. Question three was to identify the risk factors associated in functional decline. The results indicate that a large percent of patients (n=18, 40%) reported declining ADLs between baseline and admission; and 27 (60%) reported no decline before admission. Data indicated that despite small changes in average functional status scores from admission to Day 4 (.09) considerable variability exists in the trajectories of the respondents. Deaths were significantly higher among patients who experienced ADL decline during hospitalization whether or not they declined beforehand. A total of 35.7% (n=5) of patients who experience ADL decline during hospitalization died within 90 days, compared to 6.5% (n=2) of patients who improved or had no changes in functional levels during hospitalization. These data suggest that ADL decline during hospitalization may be associated with mortality regardless whether the decline occurred beforehand. There was no statistically
significant difference in risk factors for the groups between respondents who declined from admission and those who do not except depression. Respondents who declined before admission had significantly higher scores on the GDS (M=9.9, SD=5.1) compared to respondents who reported no change in the ADL (M=6.5, SD=5.5, p=.04). The researchers found no significant differences in risk factors between those who decline (n=14) and those who improved and had no change (n=31) from admission to Day 4.

Recently Padula and colleagues (2009) conducted a study to determine the impact of a nurse-driven mobility protocol on functional decline. The independent variable was mobility protocol and dependent variables were functional status and length of stay. Older adults who participated in the mobility protocol maintained or improved functional status and had a reduced length of stay. Practice implications include an emphasis on ambulation in hospitalized older adults. The study used a nonequivalent control group design. The researchers recruited a convenience sample (N = 50) of adults 60 years or older, who were admitted with medical diagnoses to one of two nursing units (n = 25 each). Inclusion criteria included an LOS of three or more days, ability to understand English, without a physical impairment that would significantly limit ability to mobilize, and cognitively intact or with a significant other able to participate. Cognitive status was determined by completion of a Mini-Mental Status Examination with a score of 24 or more. Medical patients were selected to avoid potential limitations in mobilization frequently associated with the surgical experience. Sample size statistics were conducted to determine adequate power and supported a total number equal to 50. As part of the mobility protocol, the registered nurse was directed to question orders for bedrest as well as to routinely evaluate the necessity of obstacles to mobility such as urinary catheters. It
is a priority of certified nurse assistants to walk treatment patients three to four times per day and also to assist patients to the chair for meals and the bathroom or commode for toileting. Functional status was operationalized using the modified Barthel Index (BI) 20 and the Up and Go test. Hypothesis 1 that older adults who participate in a mobility protocol will maintain or improve functional status from admission to discharge was supported. The treatment group had greater improvement in functional status as measured by the BI than the control group (p = 0.05). Hypothesis 2, that older adults who participate in a mobility protocol will maintain or improve functional status from admission to discharge was supported. (p < .001). Consistent with the literature, a significant decline in function between preadmission and admission was detected in both groups.

**Gaps/Further Research**

Although Bloomberg’s (1997) immobilization study suggests that the majority of muscle mass and strength can be regained with exercise after a period of disuse, few data were available on middle-aged, female subjects and virtually none on older adults. The time course and potential for full recovery remains to be defined and requires further research as to what is the optimal mode, duration and intensity of exercise that bedrest patients can use to minimize changes in musculoskeletal structure and function. There remain few studies that examine the role of exercise in the hospital. In the randomized control exercise intervention conducted by Siebens and colleagues (2000), which resulted in no difference between exercise and length of stay, the dose of exercise actually received during hospitalization may have been too low. They chose a minimally challenging exercise program because of their concern for the potential risk of exercising
hospitalized older adults too vigorously. The researchers recommend that continued efforts be made at investigating the potential of prescribing the appropriate exercise program as a routine component of hospital recovery in older adults. In their effort to determine if resistance exercise can prevent hospital related decline, Mallery and colleagues (2003) found no difference between the resistance exercise group and the control group who received ROM exercises. The benefits of the exercise program on functional decline were not determined. The researchers suggested that further research comparing resistance training to other exercise such as walking or low intensity exercise, using functional outcome measures to determine efficacy. The positive adherence results in their study can be attributed to the placebo effect resulting from the participants’ knowledge of participating in a study. The limitation to the study was possibly attributed to the small sample size (n=39). The proportion of patients with contraindications to the exercise program was high where 90% of the older adults admitted were ineligible or non-participants. Further investigation may be necessary to determine reasonable exclusion criteria to use when studying exercise in hospitalized older adults. Although the study by Fahlnan and colleagues (2007) concluded that resistance training and the combination of resistance training and aerobic exercise are capable of producing significant increases in strength in functionally limited older adults, the study did not determine the optimal intensity necessary for improvement. The authors recommend that future studies should focus on increasing the training over a twelve-month period. The participants were self-selected which can pose as a limitation to the study because they might not be representative of the total functionally limited population.
Koronay et al. (1995) described a walking program aimed at preserving and enhancing the functional mobility of the frail elderly residents of a 550-bed, long-term care institution. The first 23 participants in the program were recruited into an evaluative project consisting of comprehensive functional assessment one month prior to commencement of the program and four months after. They found a significant improvement in the ambulatory status of the residents \( (p<0.01) \) and a significant decrease \( (p<0.05) \) in the fall rate of this group. However, improvement was not demonstrated in cognitive status or in activities of daily living. The frail, functionally impaired subjects benefited as much in ambulatory status and fall reduction as did the functionally independent group. This study did not support a correlation between increased mobility and functional independence due to the small sample size and the lack of the control group.

**Summary**

The *Walking for Wellness* program initiated by Tucker et al. (2004), demonstrated the feasibility of implementing such program to improve the ambulation in hospitalized older adults; however the program encountered several barriers. Many patients did not have friends or families that were able to assist with ambulation. Some lost walking time because of delayed enrollment. The coordinator position was eliminated due to budget constraints. This left the program with inadequate support for growth and visibility. Unfortunately the only outcome of the program that was measured or reported was satisfaction with the program. The author recommends that future studies will be needed to determine the effectiveness of a walking program in maintaining mobility, and preventing de-conditioning. Based on the study of Callen et al. (2004) on the frequency
of hallway ambulation in hospitalized older adult, there were many limitations that could have resulted in a low outcome. Patients may not have understood the importance of maintaining ambulation and physicians and other health care providers may have not discussed an appropriate level of activity. Additionally the study was constrained by observational design which did not allow data collection. Only hallway activity was observed, therefore not accounting for any walking that may have taken place in the room. The observation only took place in a three-hour block only on weekdays. The researchers did not assess factors that encourage or impede self-initiated walking. Since the study was limited to one academic health care center, it is unknown whether other academic or community hospital may foster an environment more conducive to walking. Wakefield and Holman (2007) attempted to describe functional trajectories in hospitalized older adults and associated risk factors. The strength of the study was the assessment of preadmission functional status and use of standardized follow-up period during hospitalization. The study assessed the factors that previous works had ignored, such as social activity, functional decline at admission, depression and visual impairments which are significant predictors of decline. The results extended previous works demonstrating that ADL function is unstable in older hospitalized patients, that functional loss occurs before admission and it is possible to recover (Covinsky et al., 2003). However, the study’s limitations include its small convenience sample of mostly White male patients. Since the ADL was self-reported, Covinsky and colleagues (2003) demonstrated the validity of patient self-report stating that patients tend to overestimate their ADL capacity. The study did not employ a measure of illness severity which may have further informed their interpretation of the data. The authors suggest it would be
beneficial to have a longer follow-up assessment period after discharge to assess the potential to return to baseline function. Padula et al. (2009) engaged the nursing staff in a walking study, which resulted in improvement in functional status and decreased length of stay with the treatment group. However, consistent with the literature, a significant decline in function between preadmission and admission was detected in both groups. Limitations of the study include the recognition that the lower functional level of the control group, though not significant, could have contributed to increased LOS and/or later ambulation. These, in turn, may have been caused by other factors such as acuity and disease burden, which were not measured in this study. Further study with quantification of the impact of diseases is indicated. This finding has important implications for both lay and professional care providers.

**Tools**

There are several experimental programs designed to improve functional level and prevent decline in hospitalized older adults such as geriatric evaluation and management programs, geriatric consultation teams and inpatient geriatric care units. However, in spite of extensive evaluation the geriatric interventions have shown limited success in improving the functional status in hospitalized older adults (Winograd & Stearns, 1990; Cohen & Feussner, 1989; Rubeinsten et al., 1991). The failure of past interventions to prevent functional level decline has been attributed to an inability to target patients who are at risk for declining function and might benefit from such interventions. It would be useful to know at hospital admission which older adults were more likely to experience a decline in functional status. Assessing patients for these predictors at hospital admission is the key to intervention. To develop an intervention to prevent decline in functional
levels, it is important to start with a valid and reliable screening tool. Sager and colleagues (1996) conducted a study to develop and validate an instrument for stratifying patients, on hospital admission based on their risk of developing decline in function according to ADLs. The study was a multicenter prospective cohort study from four university and two private non-federal acute care hospitals. The patient populations used in the analysis were two distinct groups of patients enrolled in Phase I observational studies and Phase II clinical trials of the Hospital Outcomes Project for the Elderly (HOPE). The development cohort consisted of 448 patients and the validation cohort consists of 379 patients who were 70 and older and who were hospitalized for acute medical illness between 1989 and 1992. All patients were evaluated on hospital admission to identify baseline demographic and functional characteristics. They were then assessed at discharge and three months later to determine decline in ADL functioning. All data were obtained by trained interviewers following predetermined protocols and using standardized data collection instruments across all sites. Data from the individual sites were compiled at the Data Coordinating Center. Decline in ADL function during hospitalization was defined as a net decrease in the number of ADLs performed independently when compared with the preadmission baseline. The net decline of at least one ADL at discharge was the dependent variable. The actual predictive performance of the risk score at the time of discharge was evaluated by calculating under the receiving-operating characteristic (ROC) curve. In testing the Hospital Admission Risk Profile (HARP), the Area Under the Curve (AUC) proved to be moderate (AUC 0.65). The investigators ascribe this moderate predictive ability to the fact that HARP describes the patient variables but not the illness or process of care variables, both of
which may be important in the development of functional decline in older adults.

Independent variables included demographic variables (age, gender, living arrangements and race). Chi square statistics were used to test differences between proportions. Wilcoxon sum scores were used to test differences between mean ranks for continuous variables. Logistic regression analysis identified three patient characteristics that were independent predictors of functional decline in the development cohort: increasing age, lower admission Mini Mental Status Exam Scores (MMSE) and lower preadmission IADL function. The MMSE is the most widely used measure of cognitive function. It measures several domains of cognitive function including: orientation, registration, attention, calculation, recall language, and visual construction. A scoring system was developed for each predictor variable and patients were assigned to low, intermediate and high risk functional categories. The rates of ADL decline at discharge for the low, intermediate, and high risk categories were 17%, 28%, and 56% in the development cohort and 19%, 31%, and 55% in the validation cohort respectively. Patients in the low risk category were significantly more likely to recover ADL function and to avoid nursing home placement during the three months after discharge. Since the logistic regression analysis indicated that longer lengths of stay were significantly associated with functional decline, a mean comparison was made for those patients in both cohorts who declined and did not decline in ADLs within each risk category. Mean hospital length of stay was significantly longer for those patients who declined in ADL function in each risk category: low (11.8 days vs. 7.5 days, \( p < .001 \)); intermediate (10.2 days vs. 8.3 days; \( p = .046 \)); high (9.4 days vs. 6.7 days, \( p = .014 \)). HARP is a simple instrument suitable to identify patients at risk for functional decline who could benefit from comprehensive
discharge planning, specialized geriatric care and experimental interventions such as an early ambulation program (refer to Appendix 2). The researcher’s topic is on preventing functional decline and maintaining existing functional status by an implementation of an early ambulation program for hospitalized adults. An assessment of functional ability is necessary to provide a framework for planning care. By applying the HARP as an assessment tool, the researcher can focus on the capacity of the older adult and consider both physical and psychological functioning. The HARP helps to identify the effects of normal aging changes, cognitive function, and the ability to perform ADLs (Graf, 2008).

Based on the previous research, there are a variety of programs and interventions that are tailored to improve functional outcomes of the hospitalized older adult. Several models have been addressed in the hospitalized setting such as the geriatric consultation services or specialized geriatric units and acute care for the elderly. Although some studies have demonstrated the effectiveness of these models, they have limitations that restrict their widespread dissemination. Complications of immobility have been well described in the literature. Unfortunately there is not enough evidence to be certain of the benefits and harms of exercise programs for hospitalized older adults. The purpose of these geriatric consultations is to educate other health care workers on the unit on safety protocol in the older adult population. However, care is not focused primarily on the older adults and the units are not elder friendly. The major theme that continues to resurface from the literature is that older patients need to be assessed when hospitalized so that appropriate interventions can take place to prevent declining functional levels. There is no gold standard for the amount of exercise needed to prevent adverse changes in functional level. The hospital can be a dangerous environment for the older adult if
bedrest is enforced. Physical exercise programs limit the general de-conditioning of the body that accompanies aging. Therefore, an acceptable exercise program developed and integrated in the hospital setting may prevent adverse outcomes. Work is now needed to prevent functional changes in the acute setting.

The study of functional decline is of interest not only to clinicians, but also to patients and their family, health administrators and health policy makers because it is associated with increased risk of mortality, institutionalization and higher societal costs. The hospitalized older adults are at an increased risk for poor outcomes such as increased length of stay, iatrogenic complications, institutionalization and functional decline. To prevent functional decline the clinician must focus on functionally-oriented care and identify risk factors to intervene. Clinicians should routinely conduct risk assessments on admission and systematically monitor at-risk patients. Functional decline is a common and serious problem in older hospitalized patients, resulting in a change of quality of life and lifestyle. Based on previous research, a mobility regimen may offer the promise of improving functional outcomes. Mobility has been recognized as a component of primary, secondary, and tertiary prevention of overall disease morbidity and mortality (Siebans et al., 2000). However, data are limited as to the role mobility and walking might play in treating the effects of acute de-conditioning. An increased attention to data generation regarding early ambulation would be necessary to support the notion that functional decline and de-conditioning may be potentially reversible or preventable. In addition to utilizing tools to assess the hospitalized older adult, assessments of the hospital culture for providing care to the older adult is imperative. Hospital
administrators must recognize that hospital-acquired functional decline is a poor outcome and should allocate the resources to institute ambulation programs.
Chapter 3: Research Design Methodology

The General Perspective

This chapter describes the problem statement, research question, hypotheses, research design methodology, research context, survey instruments, research participants, and procedure for data collection and analysis. The cause of functional decline is multifactorial for hospitalized older adults. Hospitalization imposes a degree of immobility which can be devastating for the older adult. This quantitative study examines the effect of a structured mobility program on functional status in hospitalized older adults. The Movement is Medicine Program employs strategies of inquiry and uses data collecting instruments that produce statistical data. In order to examine relationships among variables and emphasize measurement the quantitative approach was used in this study. The quantitative approach focuses primarily on the post positivist claims for developing knowledge. It involves stating hypotheses, conducting a study and analyzing data and stating conclusions based on the results (Cottrell & McKenzie, 2005).

Given the increase in the older adult population, the challenge to conduct research to enhance the care given to older adults in the acute care setting is crucial. Until the last decade little was known about what happens to hospitalized older adults. This issue is critical to successful aging because almost all older adults are hospitalized as they develop acute and chronic illnesses. It has been argued that older adults often leave the hospital less able to function than before they were admitted (Graf, 2006; Brown et al., 2004). Many older hospitalized patients are discharged in worse shape before their acute
illness and many do not recover. This may be because they are resting in bed during their hospital stay. While in the hospital, older adults may be left immobilized in a bed or chair, quickly becoming de-conditioned. The de-conditioning effects of acute inactivity (bedrest) have been studied extensively in younger healthy people as part of the American space program (Siebens, 1990). Changes occur in coordination, muscle strength and balance. The loss of muscle strength may decrease protein synthesis. This can inhibit resistance training in young healthy adults. Studies on the effects of acute bedrest on healthy older adults have not occurred. However, similar results with greater clinical consequences would be expected since older adults are the most sedentary age group. Creditor (1993) suggests lack of activity and exercise during hospitalization of older persons may contribute through the direct physiological effects of de-conditioning. Acute hospitalization in older adults is associated with functional decline which can be prevented (Graf, 2006). Complications of hospitalization such as bedrest could be contributory. This topic opens up a promising area of investigation. Complications of immobility have been well described in the literature. Unfortunately there is not enough evidence to be certain of the benefits and harms of exercise programs for hospitalized older adults. There is no gold standard for the amount of exercise needed to prevent adverse changes in functional level. The hospital can be a dangerous environment for the older adult if bedrest is enforced. Physical exercise programs limit the general de-conditioning of the body that accompanies aging. Therefore an acceptable exercise program developed and integrated in the hospital setting may prevent adverse outcome. As a certified geriatric resource nurse and a Gerontologic Nurse Practitioner, the researcher has noticed increasing decline in functional levels, which is considered the
leading complication of hospitalized older adults. Older patients are being discharged with worse baseline function than admitted. Research has shown that functional decline loss is avoidable and nursing care can have a significant impact on preventing decline. Interventions such as mobilization to prevent decline can have an impact on improving outcomes for the hospitalized older adult. The researcher’s topic focuses on the effectiveness of a walking program.

The Research Question

What are the effects of an early ambulation program on functional levels and patient satisfaction in hospitalized older adults?

The Research Hypotheses

1. Older adults who participate in a mobility protocol will maintain or improve functional status.
2. Older adults who participate in a mobility protocol will experience a reduced length of stay.

In order to examine the relationships between and among variables the researcher used quantitative methods. When one group receives the treatment protocol (walking regimen) and the other group does not, the researcher can determine if the walking regimen and not other factors influenced the outcome. The researcher performed action research as an insider within the organization. Insiders in collaboration with other insiders work toward influencing organizational change. By conducting the research, the researcher can discover new evidence-based protocols to optimize function for older hospitalized patients.
The Research Context

Glatthorn and Joyner (2005) avow that the research context is used to identify the location as well as the time the study is being conducted. The study’s setting was in a 261-bed community hospital affiliated with a major medical center located in western New York. The research activities covered a three-month period in the fall season.

Research Participants

The population of interest to this study is the hospitalized older adult admitted to the Acute Care for Elders (ACE) and medical units. The ACE unit is the only resource of its kind in the region. ACE units are patient-centered, emphasizing independence by implementing protocols that are designed for prevention of disability and for rehabilitation. Based on previous walking programs and hospital programs for the hospitalized older adult, the researcher has devised practical inclusion and exclusion criteria. This group was previously identified as most likely to benefit from extra walking in an institutional setting. Participants in the mobility program were a convenience sample based on the admission to the designated floors from the Emergency Room or a transfer from another service. Participants were admitted to either the ACE unit or a general medical unit in the same hospital. The researcher had no control as to which units the participants were admitted. However, the two units that were selected for the study have similar patient populations. The intervention and control group participants had an equal chance of being admitted to the ACE unit or the general medical unit. The interventional group patients were those admitted to the ACE unit. Those patients who had met the criteria were approached to be enrolled in the study. All patients meeting the criteria were instructed that the walking program was incorporated as their usual plan of
care. However, patients were allowed to refuse to take part or withdraw from the program at any time until they were discharged. The control group was admitted to the general medical unit. All participants were screened during admission and had 48 hours to enroll in the program. At that time, an educational video and brochure was provided for further information to all possible participants.

Estimated effect size for the association between functional decline and mobility intervention was based on the effect size reported in the literature and assisted in determining a sample size that would have a power of .90. Power analysis builds on the concept of an effect size (Polit and Beck, 2008). Based on the effect size and a desired power of .90 a sample of 50 was recommended. The sample size consisted of 62 participants. The inclusion criteria were designed to be as inclusive as possible while assuring that patients would benefit from the program. Participants met the following criteria to be enrolled in the study:

1. Age 65 or older (men and women)
2. Ambulatory upon admission (walkers, canes or crutches accepted)
3. No cognitive deficiency (per Mini Mental Status Exam- MMSE)
4. Able to verbalize in English or another language with the assistance of an interpreter.
5. Not already enrolled in another rehabilitation program.
6. Approval to participate from admitting provider.
7. HARP Score (low to moderate Risk)

The primary reason for exclusion was the inability to participate in the intervention protocols. Participants were excluded for the following reasons:
1. Non-ambulatory (not able to bear weight, heavy two-assist or wheel chair bound)
2. Declined to participate
3. Did not receive approval from prescribing providers
4. Transferred to a non-participating unit
5. Signs or symptoms of distress when walking
6. Pain level was 4 or greater or did not express adequate pain relief with current pain regimen
7. Confused, delirious, dementia, cognitive or neurological deficits (significant cognitive deficit precluded the possibility of gathering reliable data or feedback).
8. On respiratory or droplet precautions (patient was on isolation)
9. Had a prognosis of six months or less to live
10. HARP Score (high risk)/ history of falls

Procedures for Data Collection Analysis

Since the study involved human subjects a full review application was submitted to the Institutional Review Board at St. John Fisher College and the Nursing Research and EBP Council at the hospital. The researcher attended unit rounds three times a week (Monday, Wednesday, and Friday) with the multidisciplinary team on the ACE unit to identify who would be appropriate for the mobility program. On Tuesdays and Thursdays the researcher would arrive in the afternoons to assist with the ambulation on the control unit. However, the researcher was present every weekday to collect data on the control and the intervention groups. The researcher assisted the staff on the ACE unit with the
mobility protocol. The Clinical Coordinators from both units provided the researcher with a print-out of the unit census. The census included patients’ age, diagnosis, and admission date. All patients identified as ambulatory were initially approached. Patients were screened to determine if they could walk the perimeter of the unit (210 feet). The 210 feet was selected as the distance walked because it happened to be the perimeter of the ACE unit. The researcher wanted to establish a distance goal to assure that all participants in the intervention group received the same amount of exercise. Based on the results the researcher can then determine if the 210 feet was a sufficient amount of exercise. According to the literature review many of the exercise interventions did not quantify how much exercise the intervention protocol account for. This left the researcher wondering if the intervention was too rigorous or not rigorous enough.

The researcher would also read their charts for further information. At times patients may not be aware if they had previously enrolled in a cardiac rehabilitative program which would exclude them from the study. In addition the researcher read the charts to assure consistency of the information given by the patients. If patients met the inclusion criteria they were approached to participate in the study. Those that agreed to participate were given a brochure and shown the information video for further clarification. For those patients who were undecided they were also invited to watch the video.

_Instruments Used in Data Collection_

The researcher’s topic is on preventing and maintaining functional decline by an implementation of an early ambulation program for hospitalized adults. An assessment of functional ability was necessary to provide a framework for planning care. Eligibility
in the study was based on the Hospital Admission Risk Profile (HARP), a reliable and valid measure for at-risk patients for functional decline during and after acute hospital illness. The HARP helps to identify the effects of normal aging changes, cognitive function, and the ability to perform activities of daily living (ADL) (Graf, 2008). The HARP stratifies patients into risk categories, identifying those most at risk for new disabilities.

Three patient characteristics: age, cognition and preadmission Independent Activity of Daily Living (IADL) scores have been found to be independent predictors of functional decline on admission. Age has been directly correlated to higher risk. In regards to age, the younger the individual the lower the HARP score. A patient under 75 years old will receive a score of 0, whereas a patient greater than 85 will receive a score of two. Cognition was assessed using the abbreviated 21-question Folstein Mini Mental State Exam (MMSE) which consists of 10 orientation questions, three registration (immediate memory) items, five attention items and three recall items. It was imperative that participants scored high on the MMSE so that they were cognitively able to assess their own limitations for scoring in the HARP tool. A decline in one’s cognitions is indicative of functional decline, because the individual may not fully understand the necessary actions to improve one’s health status. Preadmission function in seven IADLs (telephoning, cooking, shopping, using transportation, housekeeping, and managing medication and finances) was evaluated by asking whether assistance was needed in any of the tasks. The HARP uses IADL assessment because a loss of ability to perform IADLs usually precedes a loss of ability to perform activities of daily living (ADLs). Each category yields a sub score and the three risk sub scores are tallied to get the total
score. Total score ranges and their meanings are as follows: 0-1, low risk of a loss of ability to perform ADLs; 2 or 3, intermediate risk; and 4 or 5, high risk. These scores enabled the researcher to identify which patients were likely to benefit from the structured walking intervention.

Participants’ functional level was assessed using the HARP screen upon admission and on the day of discharge after participating in the structured ambulation program. Participants in the control group were assessed using the HARP tool; however no further interventions were prescribed. These participants were on the medical floor and received “usual care” as directed by their physicians and multidisciplinary team. Several had bedrest orders even though they were capable of walking. Few had activity orders that were written “ad lib” which can be interpreted in a number of ways based on staffing or the patient’s request. Some walked in their rooms or around the nursing station with staff or family members, but were not under a structured ambulation plan.

**Procedures**

The purpose of this study was to explore relationships in functional levels via a structured ambulation program. The control group received usual care based on the unit’s protocol. The risk to subjects in this study (patients >65 years old) were minimal pertaining to a sense of coercion to participate in the study, risk of falling and invasion of privacy. Disclosures of the patients’ rights were emphasized before they chose to enroll. Efforts were undertaken (see RSRB application) to minimize these risks. Patients signed an informed consent and received approval from the admitting provider (See Appendix A). Once the subject agreed to participate in the study the researcher evaluated the individual ambulatory status.
Demographic characteristics were obtained at the time of admission. Patient characteristics of age, gender, marital status, educational level, living arrangement and retirement status were also analyzed. Data were locked in a file cabinet so only those directly involved with the research had access. Data will be kept for three to five years then disposed of according to confidentiality guidelines.

The distance walked twice a day was total of 210 feet (the distance around the nursing station). A walking assessment by the researcher was followed in determining the participant’s comfort level while ambulating. A checklist was placed on the unit indicating the participants who completed the walking regimen daily. Since the ACE unit’s goal is to provide patient-centered care for older adults all patients that were ambulatory were encouraged to walk. All walkers were under the auspice of the Step It up a Notch Program. This other program targeted anyone who could stand up and take a few steps and not necessarily walk the perimeter of the nursing station. These patients were encouraged to move to the sound of music. The music that was played was predominately from the 1950-1960s representing music in the era that the older patients were familiar with. However, data were collected only on participants that met criteria for the Movement is Medicine study. The participants in the study signed the consent form and ambulated twice a day around the nursing station during their hospital stay during the weekdays. The participants walked with nurses and other staff members on the unit for the entire 210 feet. Some used assistive devices while others were completely independent. The researcher kept track of when the participants were being discharged through the clinical coordinators and by reviewing their charts. On the day of discharge the intervention and control participants’ functional status was reassessed according to
the HARP tool. The researcher paid particular attention to the MMSE of the HARP to assure that participants did not decline cognitively. All study participants received a pedometer (free of charge) on the day of discharge. The pedometers were distributed in the hopes that patients will continue to walk outside of the hospital setting. The findings by Fisher and colleagues (2010) demonstrate that pedometer use can provide a goal for the number of increased steps for the patient and their caregiver.

Data Analysis

Data analysis in quantitative design is analyzed by applying statistical procedures (Polit & Beck, 2008). Data were analyzed using descriptive statistics. Inferential statistic tests were used to compare groups in terms of variables. The independent variable in this study was the intervention (walking); meanwhile the dependent variable was the outcome (functional levels). Statistical analysis of the data was conducted using Statistical Product and Services Solutions (SPSS Version 17.0). Preliminary analysis involved calculation of means and standard deviation scores and t tests to compare the mean scores between the control group and the intervention group. Direct logistic regression was performed to assess the impact of three factors on the second HARP score.

Chapter Summary

The study of functional decline is of interest not only to clinicians, but also to patients and their families, health administrators and health policy makers because functional decline is associated with increased risk of mortality, institutionalization and higher societal costs. The hospitalized older adults are at an increased risk for poor outcomes such as increased length of stay, iatrogenic complications, institutionalization and functional decline. To prevent functional decline clinician must look for risk factors
and intervene. Functional decline is a common and serious problem in older hospitalized patients, resulting in a change of quality of life and lifestyle. This quantitative study was based on a quasi-experimental design utilizing equivalent control and intervention groups. The independent variable was the mobility protocol and dependent variables were functional status and length of stay. A pre-test post-test design using mobility as the intervention shed light on patients’ outcomes. Based on previous research a mobility regimen may offer the promise of improving functional outcomes. Hospital administrators must recognize that hospital-acquired functional decline is a poor outcome and should allocate the resources to institute ambulation programs. This chapter has explained the methods that were used to assess functional status of participants and determine the effectiveness of an early ambulation program in hospitalized older adults. Such results can have implications for care provided in the hospital setting and can offer insight for hospital administrators and health care providers on providing patient-centered care to older adults.

Conclusion

This chapter included an overview of the study, a description of the study’s context, including the research methodology, design and intervention. A description of the participants for the study, and the HARP tool that was used for data collection were addressed. A step-by-step description of the procedures for obtaining the data and analysis was also discussed. This chapter describes the quantitative method of inquiry to determine the effects of a structured mobility program on functional status in hospitalized older adults. The relationships between age, baseline HARP score, and discharge HARP score were investigated using Pearson product-moment correlation coefficient. An
overview of quantitative design, research context, participants, data collection tools, and data analysis has been presented. The next chapter presents the results obtained with those methods.
Chapter 4: Results

Introduction

The purpose of this study was to determine the effects of a structured ambulatory program on functional status in hospitalized older adults. The researcher explored whether an ambulatory protocol would maintain or improve functional status from admission to discharge and reduce length of stay. The Hospital Admission Risk Profile (HARP) scale was used to measure functional status. The study was launched using hospitalized patients on two medical units.

This chapter discusses the findings of the study in relation to the research question and hypotheses. Data analysis was conducted using SPSS 17.0 (SPSS Inc. Chicago, IL).

The Research Question

Does a structured ambulation program affect functional status in hospitalized older adults?

The Research Hypotheses

1. A structured ambulation program will improve or maintain functional status for hospitalized older adults from admission to discharge.
2. Hospitalized older adults who participate in an ambulation program will have reduced length of stay (LOS).

Demographic Findings

Over two hundred charts and patient records were screened for eligibility. Of those, 62 eligible participants were enrolled. Of the enrolled participants, 11 were
withdrawn from the study for a variety of reasons including being transferred off the study units (n=3) or to a different health facility (n=2), hospital stay less than the minimum three days (n=2) required for the study, or no longer met the eligibility requirements (n=3). One of the participants became confused and one client expired after walking the previous day. Study data were collected within 48 hours of admission for eligible participants consistent with the study inclusion criteria. (See Table 4.1)

The sample consisted of 24 men and 27 women; the mean age was 76 years, with a range of 65 to 92 years. The majority of the participants (n=47, 90%) were Caucasian. Eighty-six percent of the participants (n=45) had completed high school or greater. The majority (n=30, 58%) acknowledged using some type of assistive device prior to admission such as a walker or cane. Forty percent of the participants (n=21) were either married or widowed, meanwhile sixty percent were single. The diagnoses ranged from periorbital cellulitis to chronic heart failure. The diagnoses were categorized by body systems for analytical purposes. Twenty-six percent (n=14) were admitted for a cardiac or respiratory disorder, with gastrointestinal disorder being a close second (n=13).

The HARP provides risk scores in the three categories of age, cognitive function and IADL status, which are added to get the total raw score. The total scores indicated the risk of a loss of ability to perform ADLs which relates to functional status. The HARP score ranges are as follows: 0 or 1 low risk; 2 or 3, intermediate risk; and 4 or 5 high risks. The mean baseline Hospital Admission Risk Profile (HARP) score was 4.8 (SD=2.51) which indicates intermediate risk. Two of the participants were considered “social admits” since they were admitted while waiting for placements at an assisted living or enriched housing.
Table 4.1

Demographics of Participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>Overall n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years): mean, SD</td>
<td>76 (7.6)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24 (47%)</td>
</tr>
<tr>
<td>Female</td>
<td>27 (53%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>47 (90%)</td>
</tr>
<tr>
<td>Other</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>&lt; HS</td>
<td>6 (12%)</td>
</tr>
<tr>
<td>HS and greater</td>
<td>45 (86%)</td>
</tr>
<tr>
<td>Assistive Device upon Admission</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30 (58%)</td>
</tr>
<tr>
<td>No</td>
<td>18 (34%)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>31 (60%)</td>
</tr>
<tr>
<td>Married or Widowed</td>
<td>21 (40%)</td>
</tr>
<tr>
<td>Admitting Diagnosis</td>
<td></td>
</tr>
<tr>
<td>Cardiac and respiratory</td>
<td>14 (26%)</td>
</tr>
<tr>
<td>Integumentary</td>
<td>5 (10%)</td>
</tr>
<tr>
<td>Neurology</td>
<td>6 (11%)</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>13 (25%)</td>
</tr>
<tr>
<td>Renal</td>
<td>10 (19%)</td>
</tr>
<tr>
<td>Hematology</td>
<td>2 (4%)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (4%)</td>
</tr>
<tr>
<td>Baseline HARP score: mean ,SD</td>
<td>4.8 (2.51)</td>
</tr>
</tbody>
</table>
Figure 4.1. Diagnoses.

The pie chart represents a diagram of the diagnoses represented among the participants collectively.
Table 4.2
Demographic Characteristics of Data – Producing Sample

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years): mean, SD</td>
<td>78 (7.6)</td>
<td>74 (6.8)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15 (47%)</td>
<td>9 (47%)</td>
</tr>
<tr>
<td>Female</td>
<td>17 (53%)</td>
<td>10 (53%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>31 (97%)</td>
<td>16 (80%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (3%)</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; HS</td>
<td>4 (13%)</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>HS and greater</td>
<td>27 (87%)</td>
<td>18 (90%)</td>
</tr>
<tr>
<td>Assistive Device upon Admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>19 (68%)</td>
<td>9 (45%)</td>
</tr>
<tr>
<td>No</td>
<td>9 (32%)</td>
<td>11 (55%)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>20 (62%)</td>
<td>11 (55%)</td>
</tr>
<tr>
<td>Married or Widowed</td>
<td>12 (38%)</td>
<td>9 (45%)</td>
</tr>
<tr>
<td>Admitting Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac and respiratory</td>
<td>10 (31%)</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>Integumentary</td>
<td>1 (3%)</td>
<td>4 (20%)</td>
</tr>
<tr>
<td>Neurology</td>
<td>1 (3%)</td>
<td>5 (25%)</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>10 (31%)</td>
<td>3 (15%)</td>
</tr>
<tr>
<td>Renal</td>
<td>7 (22%)</td>
<td>3 (15%)</td>
</tr>
<tr>
<td>Hematology</td>
<td>2 (6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>other</td>
<td>1 (3%)</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Baseline HARP score: mean, SD</td>
<td>2.3 (1.4)</td>
<td>1.6 (1.1)</td>
</tr>
</tbody>
</table>
The intervention group participated in the mobility protocol while the control group received usual care. The mobility protocol consisted of walking completely around the nursing station (210 feet) twice a day. In comparing the intervention and control group there was no difference in the mean age range \( (p=.28) \). The percentages of male and female in both groups were similar (male=45\% & female (control) = 50\% and (treatment) = 55\%). Sixty-eight percent of the treatment group (n=19) used an assistive device compared to forty-five percent (n=9) in the control group. The intervention group was admitted for either a cardiac or respiratory disorder (31\%) each while the control group was primarily admitted for a neurological disorder (25\%). Baseline HARP score for intervention group was close to being statistically significantly higher than for the control group \( (p=.062) \).

*Figure 4.2. Baseline HARP for Intervention Group.*
Table 4.3

*Primary Outcome Variables*

<table>
<thead>
<tr>
<th>Primary Outcome Variables</th>
<th>Intervention Group</th>
<th>Control Group</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge HARP score: mean, SD</td>
<td>3.3 (1.6)</td>
<td>2.9 (1.4)</td>
<td>.306</td>
</tr>
<tr>
<td>HARP score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better</td>
<td>4 (13%)</td>
<td>0 (0%)</td>
<td>.233</td>
</tr>
<tr>
<td>Same</td>
<td>25 (81%)</td>
<td>19 (95%)</td>
<td></td>
</tr>
<tr>
<td>Worse</td>
<td>2 (6%)</td>
<td>1 (5%)</td>
<td></td>
</tr>
<tr>
<td>Length of Stay: mean, SD</td>
<td>9.6 (11.4)</td>
<td>7.1 (10.5)</td>
<td>.432</td>
</tr>
<tr>
<td>Discharged to:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In care of others</td>
<td>14 (45%)</td>
<td>7 (35%)</td>
<td>.566</td>
</tr>
<tr>
<td>Home</td>
<td>17 (55%)</td>
<td>13 (65%)</td>
<td></td>
</tr>
</tbody>
</table>
Figure 4.3. Discharge HARP for Intervention Group.

The Pie charts above depicts the primary outcome variable seen in Table 4.3. The lower the HARP scores, the less risk for functional decline. The higher the HARP indicates the higher risk for functional decline. The scores are as follows in regards to risk:

- Low: 0-1 (17%)
- Intermediate: 2-3 (24%)
- High: 4 (34%)

- 0
- 1
- 2
- 3
- 4
The primary outcome of this study was to determine if the walking intervention improved or maintained functional status measured by the HARP scale. The intervention group’s HARP scores were higher indicating that they had a higher risk for functional decline. Four of the participants improved (13%) from the intervention while no one in the control group showed any improvement from admission to discharge. On the other hand, two of the participants in the intervention group had worse HARP scores. There was no statistically significant difference in discharge HARP scores between the intervention and control group ($p=.233$).

A secondary outcome of this study was length of stay. The intervention group had two-day difference compared to the control group (9.6 vs. 7.1, $p=.432$). This result does not support the hypothesis for the participants in the intervention group. However, 55% (n=15) of the participants in the control group were discharged home, which although not significant ($p=.566$) in this study, had improved from previous unit data by 2-3%. 
Figure 4.4. Baseline HARP for Control Group.
Figure 4.5. Discharge HARP for Control Group.
The Research Hypotheses

1. A structured ambulation program will improve or maintain functional status as measured by the HARP tool for hospitalized older adults from admission to discharge. Although four participants in the intervention group had improved HARP scores, likewise two had decreased HARP scores. In the control there were no improved HARP scores despite receiving “usual care”. Hypotheses I was not supported by the data.

2. Hospitalized older adults who participate in an ambulation program will have reduced length of stay (LOS). Older adults who participated in the mobility protocol did not have a reduction in their length of stay. Hypotheses II was not supported by the data.

Direct logistic regression was performed to assess the impact of three factors on the second HARP score. The model contained three independent variables (age, baseline HARP score, and group). The full model containing all predictors was statistically significant, $\chi^2 (3, N = 51) = 9.22, p = 0.026$, indicating the model was able to distinguish between respondents who improved and those who stayed the same or got worse. The model as a whole explained between 16.5% (Cox & Snell R Square) and 39.1% (Nagelkerke R Square) of the variance in status, and correctly classified 90.2% of cases. None of the independent variables made a unique statistically significant contribution to the model.
The relationships between age, baseline HARP score, and discharge HARP score were investigated using Pearson product-moment correlation coefficient (see Table 4.5). There was a strong positive correlation between age and baseline HARP ($r = .698, n=51, p < .0001$). There was a moderate, positive correlation between age and discharge HARP score ($r = .395, n=51, p = .004$. There was a moderate, positive correlation between baseline and discharge HARP scores ($r = .441, n=51, p < .001$). A majority of the participants’ HARP scores remained the same.

Table 4.4

Logistic Regression: Predicting HARP Score Improvement

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S. E.</th>
<th>Wald</th>
<th>df</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95.0% C. I.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>S. E.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.10</td>
<td>.150</td>
<td>.444</td>
<td>1</td>
<td>.505</td>
<td>.905</td>
<td>.675</td>
</tr>
<tr>
<td>Baseline</td>
<td>-.607</td>
<td>1.084</td>
<td>.314</td>
<td>1</td>
<td>.575</td>
<td>.545</td>
<td>.065</td>
</tr>
<tr>
<td>HARP Group</td>
<td>-18.283</td>
<td>8302.95</td>
<td>.000</td>
<td>1</td>
<td>.998</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>30.141</td>
<td>8302.96</td>
<td>.000</td>
<td>1</td>
<td>.997</td>
<td>1.2E+013</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.5

*Pearson Product-Moment Correlations between Age, Baseline HARP scores, and Discharge HARP scores*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1. Age</th>
<th>2. Baseline</th>
<th>3. Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>.698</td>
<td>.395</td>
<td></td>
</tr>
<tr>
<td>2. Baseline HARP</td>
<td></td>
<td>.441</td>
<td></td>
</tr>
<tr>
<td>3. Discharge HARP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Summary of Results**

The research design was a quantitative, quasi-experimental, equivalent control group. The intervention tested the effects of a structured walking program on functional status in hospitalized older adults. The HARP tool was utilized to target older adults who may be at risk for functional loss during hospitalization. The independent variable was the mobility protocol and the dependent variables were functional status and length of stay.

Data were analyzed to address the two research questions. The intervention group tends to have higher HARP scores indicating that they were more at risk for functional decline. The majority of them had the same HARP scores upon discharge which was a goal of the researcher, signifying that patients did not leave the hospital with a decline in the function with which they had originally been admitted. Those participants admitted with respiratory or cardiac disorders benefited the most from the walking intervention which speaks to their strengthening activity intolerance. Evidence exists that targeted interventions can impact the degree of functional independence for hospitalized older adults.
Chapter 5: Discussion

Introduction

This chapter consists of the discussion and interpretation of the results presented in Chapter 4. The major sections are Discussion, Implications, Limitations, Recommendations and Summary.

The purpose of this study was to determine the impact of a mobility protocol on functional decline in hospitalized older adults. A structured mobility protocol was implemented on an Acute Care for Elders (ACE) unit which focused on maintaining function for hospitalized older adults. It was anticipated that such a study would provide insight on addressing functional decline early in the hospitalization to improve quality of life for the older adult and overall outcomes.

Discussion of Findings

Functional status, the ability to perform basic self-care activities, is a significant component of older adults’ health status and quality of life (Graf, 2006). Mobility and ambulation are major components of functional status. Many older adults base their quality of life on the ability to live independently. Maintaining leg strength is vital for a client to transfer independently. Maintaining functional status forms the foundation for continued independence and health and encompasses behaviors necessary to actively engage in daily life (St. Pierre, 1998). Maintaining mobility is paramount in preserving independence in activities of daily living (ADL), yet research has demonstrated that low mobility and bedrest are common during acute hospitalization. It is now recognized that
the hospitalization, not the illness most likely contributes to the decline in the older adult patient (Covinsky et al., 2003 & Palmer, 1995).

*The Sample*

The participants in the researcher’s study were ambulatory on admission. The focus was to get those who qualified to begin the intervention within two days of admission based on a previous study that found that muscle atrophy can occur as early as the second day of hospitalization (Convertino, 1997). Every weekday morning during unit rounds the clinical coordinator (as well as other members of the interdisciplinary team) would identify those patients who were ambulatory. The researcher would then approach each prospective participant to see if they qualified and agreed to participate in the ambulatory exercises. The researcher approached over 200 candidates. Many were disqualified because they did not meet all the criteria such as age, being on isolation, and not being able to bear weight. The majority of them (approximately 50) were indeed ambulatory to some point but were unable to ambulate around the nursing station, a distance of 210 feet. Assistive devices were not a barrier to admission for the walking program as long as participants were able to ambulate the distance of the nursing station. Fifty-five percent of the participants used an assistive device for mobility. These devices were mostly rolling walkers or quad canes. This indicates that the participants that needed these assistive devices were already at risk for functional decline. Extra walkers and canes were stored in a storage room for the participants. One participant insisted on rolling the wheelchair as a means of assistance. Those with IV poles or other tethering devices simply held hands or placed their hand on the shoulder of the health care worker assisting them. Everyone was able to bear weight evenly and maintained balance. None of the
participants needed a gait belt for ambulation. Those in the control group stated that at times they would walk around in the room or when family members came to visit in the evenings. Several had physical therapy consults before being discharged. Many confided in the researcher that their nurse or staff was either too busy to walk with them or failed to inquire about their mobility status.

Time was also not a factor in the walking program. Participants were given enough time to walk the perimeter of the unit. Thirty of the potential subjects were disqualified due to low mini mental exam scores (less than 14) indicating they had an element of confusion or delirium placing them at risk for cognitive decline. Mallery and colleagues (2003) found no difference between the resistance exercise group and the control group with their study of functional status. However, they found that those with mild to moderate cognitive impairment were able to adhere to the program. The researcher did not include those with cognitive impairment in this study due to consent and accuracy of information when using the HARP tool for baseline and discharge assessment. If another tool was used to measure functional decline those with cognitive impairment could have been included. The researcher wanted to obtain feedback at discharge when calculating the HARP scores. Therefore only those who were mentally competent and cognitively intact could provide such information should be included. This information is pertinent to the HARP scores because it relies on the individual to recount IADL’s that they can perform.

Demographics

Over 40 of the prospective participants were of diverse backgrounds (African Americans, Hispanics and East Indians), although ambulatory they were all under the age
of 65 which was the starting age to participate in the study. Many were admitted for chronic conditions that were exacerbated leading to the hospital admission, however they were not able to be included in this study by not meeting the age criteria. This is consistent with what the literate states that racial and ethnic disparities in health care exist even when insurance status, income, age, and severity of conditions are comparable. The death rates from cancer, heart disease, and diabetes are significantly higher in racial and ethnic minorities than in whites (Nelson.2002). These disparities in health care occur in context of broader historic and contemporary social and economical inequality. As indicated in table 4.1 the majority of the participants both in the control and experimental group were Caucasians.

**Admitting Diagnosis**

In Table 4.2 the participants’ demographic admitting diagnoses are noted which can be a factor in functional status. The majority of the participants were admitted for cardiac or respiratory disorders n=14. Six of these participants were admitted for congestive heart failure (CHF), which left them short of breath and easily fatigued, placing them at risk for activity intolerance. However, the walking intervention seemed to have been beneficial for this group because walking is considered an aerobic exercise. This in turn will cause one to breathe more deeply, thereby increasing the amount of oxygen in the blood. The heart will beat faster which increases blood flow to the muscles and returns to the lungs. This will improve the activity intolerance experienced by their condition. Five of the participants were admitted for obstructive pulmonary disease such as chronic bronchitis and emphysema. These five patients took the longest to ambulate around the nursing station requiring rest periods and oxygenation during the exercise.
Usually half way around the nursing station the researcher would check their oxygen
saturation and assess their respiratory status. Their oxygen saturation levels were all
within normal limits to continue walking. Unfortunately one of the participants with
emphysema had expired after being in the walking program for a week. Physicians have
speculated that his death was attributed to a pulmonary embolism that occurred in the
middle of the night while the individual slept peacefully. Six of the participants were
admitted for neurological disorders. Two of the neurological patients were admitted for
syncope after feeling dizzy and falling at home. The other four were admitted for possible
transient ischemic attacks (TIA). None of the four had any residual effects and scored
high on the mini mental section of the HARP score. The second most prevalent admitting
diagnosis was participants with gastrointestinal disorders. Four in the treatment group
was admitted on the ACE unit for gastrointestinal bleed (GIB). By the time they were
admitted in the walking study they were transfused with several units of packed red blood
cells in the emergency room and were not as fatigued. The rest of those with GI disorders
were admitted for abdominal pain or absorption disorders and were schedule for various
diagnostic tests for cause. Six of the participants in both the experimental and control
group with renal disorders were hemodialysis patients with complications of end stage
renal disease (ESRD). The other four were admitted for urinary tract infection (UTI) and
needed to receive intravenous antibiotics. Two of those with UTI were their second
admission with the same diagnosis. Two of the participants from the control group were
admitted for anemia and needed further work ups. The final diagnosis of the participants
was written as “other.” This means that the patients were admitted other than a medical
reason. The researcher investigated the reason for admission and found in the chart that
these two patients were considered “social admits.” The clinical coordinator later clarified that these patients were admitted to the hospital because their care giver(s) could no longer take care of them and they needed to be hospitalized until a safe discharge plan was in place. Both of these patients did well in the walking study and were later discharged with other family members who were able to provide care.

**Overall Findings**

Although there were no difference HARP scores or LOS in the treatment verses the control group, the fact that four participants in the treatment group had improved in functional status is promising. Since the participants in the treatment group overall had higher HARP scores this suggest that the walking intervention was effective. When the researcher controlled for diagnosis, the participants diagnosed with cardiac or respiratory impairments demonstrated an improvement in their HARP score. This is consistent in the literature on the effects of exercise on the heart and lungs (Creditor, 1993; Convertino 1997). Given the normal aging process that occurs with these two major organs, this patient population can benefit the most from a mobility protocol (Graf, 2006).

As reported in Chapter 4, the majority of the participants were Caucasian. Many of the diverse ethnic groups that were hospitalized did not meet the admission criteria due to age. The researcher discovered that the majority of the hospitalized African Americans and Hispanics were younger than the age requirement. They ranged in age from 55-60 years old. Many of them were hospitalized for chronic conditions such as diabetes, end stage renal disease and cardiovascular disease. This finding is consistent with what is known about minority population (Nelson, 2002). In order to obtain data from those who
could have benefited from the walking program, the researcher would recommend lowering the age requirement to fifty-five to make it more inclusive.

The majority of the participants had completed high school and beyond. This is consistent with the finding that those who are better educated tend to take better care of their health. (Nelson, 2002). Many of the participants, when approached by the researcher were willing to participate in the study. They understood the direct relationship between walking and functional status. They expressed content that such a program was implemented to aid in positive outcomes. During the walk around the unit three of the participants on several occasion recounted negative experiences of friends and or family members that had lost function after being hospitalized. Upon discharge, when administering the pedometers over 50% of the participants stated that they already had one at home.

In addition to being educated, the majority of the participants were married. This suggests that the participants had a supportive partner which led to a more functional state. Many had been married over 4 decades and described activities that were involved with their spouses.

Those who qualified and agreed to participate were more than likely participants who were motivated and determined which is consistent with Badura’s (1986) Social Cognitive Theory. The participants demonstrate self-efficacy by regulating their behavior for a positive outcome. Their self perceptions helped shape their behavior. Many described how maintaining function led to a better quality of life which was the reason they walked while being hospitalized. Self- efficacy is considered to be one of the consistent predictors of exercise adherence. Bandura (1977) also states that modeling is a
form of social learning which is applicable in this study. Although this statement was originally meant for the pediatric population the same can be applied to the older adults in the study. When one person got up to walk it motivated the others to walk too.

Those who scored low on the MMSE were excluded from this study due to cognitive deficit. The study by Tucker et al., (2004) indicated that even older adults with dementia benefited from a walking program during hospitalization. Perhaps the researcher could orient those that were confused to the setting for better outcomes.

Prevention of falls was a concern for the members of the Evidence Based Practice Board (EBPB) at the community hospital. A few of the members felt that if patients saw other patients walking this might encourage them to get up and walk even though they do not have the strength or endurance. To decrease chance of falls the inclusion criteria was amended to in which those patients with a history of multiple falls could not participate. Patient falls are not reimbursable by medical insurance companies. Insurance carriers believe that fall incidences are iatrogenic in nature and can be prevented. All participants in the structured walking program were monitored carefully to prevent falls. Everyone who walked had on socks with grips on the bottom or slippers. In their rooms, every patient has a sign on the wall (within eye level) that read “Call before You Fall”. The proper safeguards were in place with the call light and side rails. No one who participated in the study fell during the time they were hospitalized. However care must be taken to ensure safety of all patients.

LOS Findings

This study demonstrated that there was no difference in length of stay between the intervention and control group. The participants in the intervention group that walked
daily per protocol were not discharged any earlier than those in the control group.

Functional decline can then occur as a consequence and result in the inability to perform usual ADLs. Deconditioning and functional decline from baseline was found to occur by day 2 of hospitalization in older patients (Hirsch et al., 1990). Preadmission health and functional status can indicate risk of further functional decline associated with hospitalization. There is a positive correlation between functional decline and prolonged hospital LOS. Difficulties with walking have been identified as an early marker for prolonged length of stay in hospitalized older adults (Padula, 2009). The walking exercise may not have been rigorous enough to make a difference in length of stay. Additionally, the researcher found other barriers that prevented the participants from being discharged in a timely fashion. Several of the participants had to have home care in place before being discharged. A handful of participants had to wait for a family member to be present to take them home. Usually the family member would need a day’s notice to pick up the participant. Four of the participants did not have their test results read in a timely manner to warrant discharge. One of the participants had to wait for one of the skilled patient care technicians to obtain a blood sample because many of the qualified staff members tried multiple times without success. Her discharge was dependent on the result because the participant was originally admitted with upper gastrointestinal bleed. After several blood transfusions the results would indicate if the treatments were effective. Another participant could not be discharged in a timely fashion because the facility she was being discharged to did not accept patients after two o’clock in the afternoon. One of the participants was awaiting reimbursement approval for a new medication that was prescribed. The case worker was waiting for approval from the
pharmaceutical company to ascertain if the individual received approval. One of the respiratory participants was waiting for his case to be renewed by a homecare agency. Since the individual did not live in the same county, that individual had to wait the following day when a community health nurse would be available to reopen the participant’s case. These delays previously described are attributed to a discharge system issue rather than the condition of the patient.

Usefulness of the HARP in Geriatric Assessment

Overall this study found that the HARP tool was instrumental as part of a geriatric comprehensive assessment. Functional assessment is vital to the outcome of hospitalization for older adults. Functional assessment screenings are used as a means of combating decline. This study used the HARP scores as a tool for measuring functional status. This tool was chosen for both its assessment of physical and psychological functioning. The researcher felt that these two entities were intertwined. In the acute care setting, the HARP stratifies patients’ risk for new ADL disability into low, medium or high risk categories based on scores obtained including age, preadmission IADL score and MMSE. Researchers found that three factors: increasing age, lower admission cognitive status, and lower preadmission IADL function independently predict functional decline. As discussed in Chapter 2, similar studies used various tools to measure functional status. Sanger and colleagues (1996) attempted to find a measurement tool to predict function status. Sieben and colleagues (2000) used the RAND General Health scale as a tool to measure the effects of their intervention increased exercise to shorten length of stay (LOS) and improve physical function. This was a self-rated health scale which is similar to the HARP scale in which participants rate their independence with
ADL’s. Tucker and colleagues (2004) simply used the Up and Go Test (Mathias, Nayak & Isaacs, 1986). This tool is an objective assessment used to evaluate if an individual can get out of bed or an armchair without assistance and maintain a steady standing position. The individual then walks three minutes turns around and returns to a sitting position. Padula et al., (2009) operationalized both the Up and Go test and the Barthel Index test as a functional assessment tool. The Barthel Index test (BI) is a subjective measure of an individual’s capacity to perform ADL’s. Graf (2006) mentions the Katz assessment tool as a method to assess functional status.

An abridged version of the HARP tool was currently being used at this study’s setting as an admission risk assessment tool. This tool was chosen for this study because the HARP screening tool was designed to stratify older medical inpatients for their risk of developing new disabilities in ADLs during acute medical illnesses and hospitalization, and identify who might benefit from geriatric interventions to reduce or prevent functional decline. Age is one on the components of the HARP that this study focuses heavily on. Those in the old-old age group (greater than 85) received a score of 2. This slightly increased the risk of functional decline with this patient population. Since adults are living longer with many centurions in existence, the HARP can stratify these old-old population with greater risk so interventions can be implemented in a timely fashion.

HARP tool is useful assessment and care planning for the old-old patients. Another component of the HARP that was of interest to the researcher was the cognitive assessment MMSE. Those with dementia or delirium are also at great risk for functional decline due to their inability to perform ADLs and coherently verbalize their status (Sands, Yaffe & Covinsky, 2003). Impairment in cognitive status was found to be
associated with changes in functional status in hospitalized older adults. The combination of these two components placed a prospective participant in a high risk category and was therefore excluded from the study. However, a limitation to the instrument was that the HARP was not tested on patients hospitalized for surgical procedures, those living in nursing homes before admission and those who were in critical care units. Therefore it was the appropriate instrument to apply to the general medical unit for hospitalized older adults.

Although the HARP does not include the participants’ medical diagnosis or co-morbid conditions the two can be correlated with respect to outcomes. A component of the HARP is assessing IADLs such as shopping, driving and paying bills. These IADLs may be difficult to achieve if a participant had certain chronic conditions or was acutely ill. These IADLs can be a predictor if patients are at risk for functional decline. If a patient admits that he or she can no longer drive to their monthly physician appointment due to shortness of breath this is a warning sign that decline is imminent. This component of the HARP can alert the assessor that an intervention is needed to prevent decline.

Although the diagnoses varied in this study, the patients were all mobile and could relatively perform a majority of their IADLs which resulted in lower scores on the HARP placing them in a lower risk category. Those in lower risk categories tend to have better outcomes. Those diagnosed with cardiac or respiratory disorders are prone to activity intolerance due to inadequate perfusion and high oxygen demand. Participants with activity intolerance can potentially score higher on the HARP indicating a risk for decline. Walking can increase muscle strength and stamina thereby allowing the participant to continue their activities, these patients scored higher on preadmission than
at discharge. The HARP can therefore indirectly stratify patients at high risk based on their activity which can be related to their diagnosis. Likewise a high score on the HARP can alert health care professionals that a patient is acutely ill what functional along with medical issue needs to be addressed. Baseline admission assessments have proven beneficial in identifying patients at risk for functional decline during hospitalizations.

Additional Benefits of the Study

Enhancing patient motivation. This study had established inclusion and exclusion criteria for potential participants in the study. Many who were identified did not meet the inclusion criteria due to age, functional status and or the ability to consent. The researcher found it interesting that those who were ambulatory came from a homelike setting as opposed to a skilled nursing facility. Those who were admitted from home often told the researcher how they wanted to return home and were fearful of being institutionalized. The walking program gave these clients an opportunity to engage in physical activity even though they were hospitalized for an ailment. While ambulating around the nursing station many have admitted they did not walk as often in previous hospitalizations. This finding coincides with Tucker’s (2004) Walking for Wellness Program. Tucker’s (2004) program provided an opportunity for older adults to walk in the hospital setting.

Increasing staff skill set. An additional benefit of both programs was that staff was trained on the importance of mobility as it relates to function. This study closely emulated Padula’s (2009) walking program which was nurse-driven. Padula (2009) explored whether a mobility protocol would maintain or improve functional status from admission to discharge and reduce LOS. The staff and nurses were taught by the researcher the importance of walking and most incorporated the walking program in their
patients’ care. As part of the mobility protocol, the nurse is taught to question orders for bedrest and to evaluate barriers to mobility. The walking video was shown to all those in the intervention group before they agreed to participate. It was the responsibility of the nurse or the ancillary staff to make sure that those identified as walkers participated in the walking regimen. Everyone was accountable for walking the patients. If a nurse was busy with other urgent matters and was attending to another person another staff member would volunteer to ambulate the patient. A walking chart was placed behind the nursing station desk in which all the staff can see which patients had completed the walking regimen. Staff members on the ACE can look at the walking chart and see those remaining participants that still needed to be walked. Any staff member can walk a mobile patient regardless if that individual was on their assignment. This type of cohesive and rehabilitative mindset is what is needed to have a successful program. This may be why there was no difference in length of stay; this study may have increased ambulation in all patients.

*Increasing patient satisfaction.* Similar to Tucker (2004) the researcher produced a video to describe the walking protocol to potential candidates. Overall the patients were 100% satisfied with the *Walking for Wellness Program.* Due to time constraints and administrative barriers, the researcher did not obtain quantitative data by utilizing an official Likert Scale satisfaction surveys such as the Hospital Consumer Assessment and Healthcare Providers and Systems (HCAHPS) survey. The HCAHPS is a survey instrument and data collection methodology for measuring patients’ perceptions of their hospital experience. However, based on interviews upon discharges participants were pleased they were involved in the walking program and gave positive feedback when
called by the clinical coordinators two-three days after discharge. The feedback was mostly related to their hospitalizations, however those participated in the walking program had a star next to their name which focused on their responses.

Implications for Education

As an educator, the researcher understands the importance of geriatric content and emphasizing gerontological considerations to nursing students. The researcher teaches a didactic and a clinical course in medical surgical nursing entitled Care of the Adult and Older Adult. This course is taught to junior nursing student in the baccalaureate nursing program. The course objectives consist of providing safe care to adults based on their disease process and procedures. The researcher highlights gerontological considerations as it relates to the disease process. An important responsibility of nurses taking care of the older adult is to be knowledgeable about the differences between age-related changes and pathologic conditions so appropriate interventions can be initiated. Based on this study, the researcher now emphasizes the importance of functional status and the effects of immobility on such population. In the clinical setting, the researcher focus on activity orders as it relates to the older hospitalized adult. The students are to assess functional status and adhere to mobility protocols as indicated. Subsequently all schools of nursing should include a curriculum that focuses on the care of older adults. Nursing programs need to integrate geriatric content in the lecture and clinical learning experiences. Although many nursing students start their career in the hospital setting, they know very little on how to care for the older adult. The importance of mobility in the older population needs to be stressed for the preservation of function. Since older adults will account for over 50% of inpatients by 2030 (Grayson & Velkoff, 2010), nurses and the
multidisciplinary team must develop new policy and procedures for providing age-appropriate care.

The American Association of Colleges of Nursing and the Hartford Institute for Geriatric Nursing (a division of New York University College of Nursing) has released a supplement to The Essentials of Baccalaureate Education for Professional Nursing Practice which recommends competencies and curricular guidelines for the nursing care of older adults. It provides a framework for developing, defining, and revising baccalaureate nursing curricula. In the guidelines there are 19 Gerontological Nursing Competency Statements, number 18, states “Utilize resources and programs to promote functional, physical and mental wellness in older adults.” (AACN, 2010). These competencies and curricular guidelines serve as a supplement to the 2008 AACN Essentials of Baccalaureate Education for Professional Nursing Practice to ensure that nursing students will be able to provide the necessary geriatric content for the nation’s aging population. A major focus of health promotion is to minimize the loss of independence associated with functional decline and illness. Instructors should incorporate information regarding valid and reliable tools and best practices that address physical, functional and cognitive status of the older adult. This coincides with this research study on preserving function.

The National League of Nursing (NLN) is an organization that advances excellence in nursing education and prepares the workforce to meet the needs of the diverse population. The emerging themes for 2011-2012 calendar year focuses on geriatrics. The series of conferences is entitled “Caring for the Older Adults.” "Caring for Older Adults” challenges the nursing education community to create and implement a
nursing education discipline that includes teaching the evolving knowledge of caring for older adults, designing intentional encounters with older adults in a variety of health care settings, developing students' clinical decision-making skills, and preparing students to manage care and to coordinate care during transitions across health care setting. The NLN developed a partnership with the John Hartford Foundation the Advancing Care Excellence for Seniors (ACES) project. The ACES framework is designed to help faculty prepare students to provide the best care for older adults. Unfolding case studies and teaching strategies developed by experts on geriatric nursing education are designed to be used throughout the curriculum.

In the hospital setting, nurse educators can stress the interventions that are required to maintain function. St. Pierre (1998), states that nurses who received special training in geriatric care, were integral to positive patient outcomes. As Graf (2006), reiterates, nurses are often overwhelmed by tasks and often interventions for functional status are not prioritized because many are focused on the illness that patients are admitted with. Since ambulation is not routinely monitored in the hospital setting mandatory in services and professional development session should be taught to nurses who are at the bedside.

*Implications for Practice*

Older adults have a greater prevalence of chronic diseases and disorders that lead to hospitalization, despite the limitations of this study; there are clear implications for nursing to enhance ambulation for older hospitalized patients. Brown and colleagues (2004), revealed approximately 60% of hospitalized older adult that had written orders for bed rest yet there was no documented medical indication for limiting mobility. It is
time to put bed rest to rest. The study by Fisher et al. (2010) demonstrates that patients with an activity order of “ambulate with assist” rather than bedrest or “as tolerated” is more likely to increase step activity. Activity orders by physicians and advance practice nurses should be more directive (i.e. ambulate twice around the nursing station or ambulate for 3-5 minutes). Providers should document clear indications for bedrest in their notes or in template orders sets and reassess the need for bedrest daily. In the age of electronic records and informatics more should be done to see that such orders are not routinely ordered without justification. Providers should have rationale for placing an older client on bed rest and be prompted daily on the necessity of such order. Reframing activity orders in a more active and actionable way will help to transform clinical attitudes regarding ambulation and engage caregivers in a more proactive approach.

Nurses should assess ambulation status or progress on admission and throughout the patient’s stay, with low levels of ambulation triggering more aggressive protocols. Nurses should question a bed rest order especially if clients were ambulatory preadmission. Nurses can establish walking routines for patients. Graf (2006) suggested creating an environment with hand rail on the wall, chairs placed strategically to allow rest and distances marked on the floor for encouragement. Nurses are the vital link in assuring that patients receive the most appropriate interventions for self-care and recovery.

The amount of ambulation should be measured and tracked for individual patients. Strategies to target high risk patients include ensuring that patients have the required assistive devices, including vision and hearing aids, and are seen early on in the hospital stay by an occupational or physical therapist. Nurses can collaborate with other
health care professions to encourage mobility. Family education and support is crucial in the mobility process. Additionally, nurses should identify mobility barriers such as lines, tubes and equipment that make it difficult for patients to move about. Nurses and unlicensed staff members should minimize barriers that prevent mobility in the hospital setting. Careful hospital unit design including flooring, guardrails and maintenance of the hallways free from supply carts and clutter can help motivate patients to ambulate. Practices implications include an emphasis on maintain function in hospitalized older adults. Data suggest that education, staff participation and scheduled walking activities are the key components to maintain functional status. Older adults with marginal functional capacity are at risk of functional decline leading to a cascade of illness. It is imperative that hospitals with older adult inpatients conduct comprehensive initial and ongoing geriatric assessment to formulate target strategies to enhance mobility levels and functional status such as walking programs.

One potential tradeoff of a greater focus on ambulation is the possibility of incurring inpatient falls. Medicare will no longer cover additional cost due to injury from inpatient falls. These new regulations have dramatically increased awareness and led to the development of fall prevention programs. The unintended consequence for fall prevention is the potential increase in immobility. Bedrest may be ordered by providers to prevent falls. However, the longer patients are immobile this decreases lower extremity muscle strength resulting into falls (Deshenes, 2004). Early and structured ambulation should therefore be supported as a method to prevent falls rather than promote them.

The key to preventing functional decline is timely, ongoing and systematic assessment and intervention to detect risk and intervene. Targeted interventions can
impact the degree of functional independence for hospitalized older adults. Nurse managers and leaders need to reinforce compliance through education and teaching. It is imperative to have corporate and unit based task force “buy in” to the mobility and the rehabilitative concept. The ultimate goal is to embed patient mobility into the daily work flow.

Implications for Research

Nursing–focused interventions aimed at promoting functional independence for hospitalized older adults need further exploration in formal research studies. Most research on interventions targeting functional status for hospitalized older adults was conducted at single–site locations. Replication of this study can be benefitted if additional site were included which is more representative of the population. Additional research is needed with interventions with larger sample size utilizing randomized clinical studies. Further study with quantification of the impact of diseases is indicated, especially because participants in this study, on average had about five co-morbid conditions. It would be important to analyze those who participated in the walking program how quickly they were readmitted with a similar diagnosis and their baseline HARP scores upon readmission. Further research should be conducted on the re-admittance rate of the treatment group. Participants whose length of stay included being hospitalized over the weekend may have lost some their muscle strength when the program resumed on Monday. Future studies should include a daily plan to assess daily effectiveness. Age in the inclusion criteria could be lowered to include those potential participants that were excluded due to age. Although younger these potential participants were ill enough to be hospitalized, putting them at risk for functional decline. Patients with cognitive
impairments, although not able to accurately verbalize levels of independent activity, should be included in future studies for they are at greater risk for functional decline.

Limitations

Limitations of the study include the recognition that the lower functional level of the experimental group, though not significant, could have contributed to increase LOS and minimal improvement in HARP scores. These may have been caused by other factors such as acuity and disease burden which were not measured in this study. Although differences between the groups on baseline characteristics were not detected, it is possible that differences existed and affected the findings.

One limitation to the study was the small sample size in one setting. Although this study replicated a similar study by Padula (2009) with the same sample size the results may show significance with a larger sample. The researcher collected the data over three months time span. Similar studies to assess and intervene with functional decline have taken anywhere from two months to a year for data collection. If more time was allotted to implementing the study the sample size could have been larger, thereby providing rich data. The data demonstrated slight improvement (N=4) in the treatment group as compared to the control group. This data is promising considering the treatment group was at greater risk for functional decline.

The researcher collected the data for three month until sample size was achieved. This short time frame did provide enough opportunity to assess the recidivism of the participants that were discharged. Even though the staff on the ACE floor assisted the participants with the walking protocol, they only documented the distance walked and regularity. Only the researcher collected assessment data which is a limitation to the
study. HARP scores were tallied by the researcher and could have possibly varied if a co-investigator was collecting data. This would substantiate the data indicating inter-rater reliability.

The literature affirms that loss of muscle function can occur within 2 days of bed rest or immobility (Palmer, 1995). A major limitation in this study was that the researcher was not present on weekends to supervise and assist with the mobility protocol. On the weekends, participants were not encouraged to walk even though many reported that they continued to walk on their own or with family members. Tucker et al., (2004) stressed the importance of family involvement in walking to prevent functional decline. Participants only walked during the weekdays when the multidisciplinary staff was available to conduct rounds. Therefore over the weekend, patients may not necessarily walk if they were not encouraged.

Older adults were considered patients that were 65 or older due to retirement age. This is that time that Miller (2006) felt that older adults were more sedentary in addition to normal aging changes that can lead to chronic conditions. Padula (2009), Tucker et al., (2004) used the starting age of 60 in their walking studies. Since most individuals are still in the workforce at that age, the researcher derived at the age of 65 to be starting point for the ambulation study. Participants were encouraged to ambulate around the nurse station which equated to 210 feet. Many of them were able to complete the task without overexerting themselves. The minimal requirement of this distance may not be rigorous enough to warrant any results. Perhaps the participants were accustomed to walking more and such distance did not pose a challenge. Anecdotal observations and the literature
support that hospitalized patients do not generally walk during their hospital stay, and it is possible that the presence of the researcher positively affected mobility outcomes.

Recommendations

Collaboration from the hospital management, unit clinical coordinators, social workers, and physical therapy and case managers was critical to the success and implementation of the program. The researcher has observed that the low intensity of the exercise may be one reason the program failed to demonstrate a significant benefit in hospital length of stay and functional measures.

To this day the ACE unit at the hospital continues to implement the walking program twice a day. However it has been reported by the manager that at times the walking program may not be consistent based on staffing and the busy environment (which was the impetus for this study). When the researcher was present during data collection walking was performed on a consistent basis. If staff members had to attend to more emergent situations, the researcher would either walk the patient or seek assistance. The researcher’s presence made the staff accountable for ambulation those on the list identified as “walkers”. The researcher would recommend that hospitals should hire a part time unit champions that can coordinate the walking schedules and staff needed to assure that this occurs on a consistent basis.

Conclusion

Caring for geriatric hospitalized patients will be a growing need in the coming years. Given the growing numbers of older adults, the need to review standards of care for geriatric patients is paramount. Hospitalized older adults typically experience functional decline during an acute hospital stay. Focusing on providing this patient
population with high quality and safe care requires vigilant proactive measures. This research supports existing literature that identifies that functional decline actually begins in the preadmission period. Findings suggest that early and ongoing ambulation may be an important contributor to maintaining functional status during hospitalization and to shortening LOS. The development of ambulation measurement and protocols is a step in the right direction. Ambulation should be viewed as a priority and as a vital component of quality nursing care. Nurses are in a key position to reverse the trend of functional decline seen in hospitalized older adults. Nurses who proactively identify high risk patients and promote mobility during hospitalization will have the greatest impact on improving functional outcomes. The impact of functional decline on resource utilization and health care costs may further reinforce the need to assess and intervene to prevent functional decline. Ambulation should be viewed as a priority and as a vital component of quality nursing care.

Summary

In Chapter 1 the rationale for the study was presented along with the introduction of the conceptual framework. In Chapter 2 a literature review of similar studies that addressed functional decline in older adults was presented. Many researchers have attempted to tackle this issue of functional decline and bring the importance of such phenomenon to the forefront. The interventions in the studies varied, from strength training to walking. Chapter 3 presented the researcher’s plan to study the effects of a walking program for hospitalized older adults. Chapter 4 presented the results of the tested hypotheses and research questions. The final chapter of this study restates the research problem; purpose of the study, reviews methodology used in the dissertation and
discusses the findings and implications for nursing practice, nursing education, nursing research and collaboration among the various disciplines. The results are compared to the work of others and analysis of the literature.

The research design was a quantitative, quasi-experimental, equivalent control group. The intervention tested the effects of a structured walking program on functional status in hospitalized older adults. The HARP tool was utilized to target older adults who may be at risk for functional loss during hospitalization. The independent variable was the mobility protocol and the dependent variables were functional status and length of stay.

As a nurse with an interest in geriatrics the researcher noticed that many of the older hospitalized patients were not being discharged in the same manner that they were admitted. A majority of them had to be discharged to rehabilitation facilities or with family members. Family members would complain, “This is not like mom”. When the researcher inquired, “how so”, they all expressed similar concerns that their loved ones were much more functional pre- hospitalization. Many would ask, “Have they walked mom during her stay in the hospital?” It was then that the researcher began reviewing literature on bedrest and its relationship with functional decline in older hospitalized patients. In Chapter 2, the literature review indicates this issue is a concern in the medical community for the last four decades. Dr. Olsen (1967) brought the issue to the forefront with his saying “leave them in bed and leave them dead”. Callen and colleagues (2004) discovered that bedrest was a frequent occurrence among hospitalized older adults. Many of their activity orders indicated bedrest even though the patients were mobile. Despite increasing national attention to the incidence of functional decline, the
importance of early ambulation in hospitalized older adults is understated and understudied. Nursing research that defines the evidence for practice interventions is needed for patients of all ages and especially for older adults.
References


American Association of Colleges of Nursing: Geriatric Nursing Education Project, [www.aacn.nche.edu](http://www.aacn.nche.edu/) Education/gerocomp.htm.


Hartford Institute for Geriatric Nursing: Baccalaureate Nursing Education http://hartfordign.org/education/Baccalaureate_education.


Appendix A

Consent Form

Movement is Medicine: A Structured & Individualized Mobility Plan and its Effect on Functional Levels in Hospitalized Older Adults.

Introduction
You are being asked to participate in a study designed to determine if an early ambulation program can improve outcomes for hospitalized older adults. You are being invited to participate in this study because you are over the age of 65 and have been admitted to one of the units participating in the study.

Purpose of Study
Studies have shown that when an individual is bedridden, that person can lose approximately 5% of muscle mass per day. Functional decline can begin by the second day, with the most rapid changes occurring in the legs, which results in an increased risk for falls. Research has indicated that 35-50% of hospitalized older adults have a decline in functional ability that is not related to the primary reason they were admitted. Most people think that when they are sick, they need to be in bed, but getting up and moving around speeds up the healing process. Immobility places an older adult at greater risk because normal aging results in decreased reserves to compensate for losses and return to previous level of function.
Description of Study Procedures

If you agree to participate in this study, you:

- Will be assessed for your walking and mental capacity or confusion.
- Have a walking program designed based on that assessment.
- Have a walking flow chart placed in your medical record indicating your schedule and to mark your progress.
- Participate in walking exercises under the direction of a mobility specialist, who will schedule walks based on your personalized schedule and will indicate the time and distance walked on your walk schedule. A mobility specialist is someone who is trained to walk with participants in the program. The mobility specialist is trained to walk with individuals of various functional levels. However, the mobility specialist will encourage you to be as independent as possible. The mobility specialist is also trained to notice signs and symptoms of distress to discontinue the walking exercise and seek medical help.

We also will collect information from your medical record, but your name will not be used.

If you have any pain, it is important for you to take your pain medication before your scheduled walk. Participants who rate their pain level as a 3 or less on a scale of 1-10 are allowed to partake in the walking exercises for that day.

The walk will take place around the nurses’ station and if tolerated in the corridor or the lobby of the hospital. The mobility specialist will notify your nurse that you will be off the floor for a specified time. When completing the walking exercise, the mobility specialist will notify your nurse of your arrival. You are free to continue to ambulate throughout your hospitalization even when it is not your scheduled walking time. The proposed program will not interfere with any usual walking or other treatments scheduled as part of your regular care.
Assignment

You will be assigned to control group or an experimental group if you participate in this study. Participants in the control group will receive usual care in the hospital. This care may involve walking, being out of bed to a chair or a consultation with a licensed physical therapist. Participants in the experimental group will be assigned an individualized walking program of 5, 10 or 15 minutes of walking each day including weekends. The walking times will be scheduled at your convenience and to avoid conflicting with other procedures. Your verbal assent will be obtained prior to each walk to assure that participants feel like walking at that particular time.

Benefits of Participation

You may or may not benefit from participation in this study. The findings from the study will be used in the future to determine activity orders and the effects of a structured ambulation program on functional status. All participants will receive a pedometer upon discharge to encourage ambulation.

Alternatives

If you do not wish to participate in the study, you will receive the usual care provided by your health care team. The alternative to participation is not to participate and to receive usual care.
Cost

There is no cost to participate in the study. Those who complete the program will receive a pedometer at discharge to continue to walk and monitor their progress.

Risk of Participation

The risks of participation in the study pertain to a perceived loss of time spent with the mobility specialist; potential feelings of distress if you perceive that your progress is less than expected; and potential for discomfort or fatigue as you work on strengthening and mobility. Falling while walking is also a risk, but the presence of the mobility specialist should prevent this from occurring. If at any time you feel tired, dizzy or wish to have the walking stopped, just notify the specialist and the walking experience will be stopped.

Circumstances for Dismissal from Study

If you require more acute level of care and are transferred to one of the Intensive Care Units you will be dropped from the program. You can be readmitted to the Walk Strong Program if you are transferred back into one of the Walk Strong sites and will require the same functional and cognitive assessment tests to qualify for re-enrollment in the study.

Records and HIPAA Authorization

While we will make every effort to keep information we learn about you private, this cannot be guaranteed. Other people may need to see the information and while they normally protect the privacy of the information, they may not be required to do so by law. Results of this research may be presented at meetings or in publications, but your name will not be used.

The Federal Health Insurance Portability and Accountability Act (HIPAA) require us to get your permission to use health information about you that we either create or use as
part of the research. This permission is called an Authorization. We will use your research record, information from your medical records, and both clinical and research observations made while you take part in the study.

Completion of Study

The day before or the day you are discharged, you will again be assessed for your functional ability. Upon discharge you will be given a pedometer to continue walking and track your own progress.

Voluntary Participation

Participation in the Walk Strong program is voluntary. You are free to participate or not to participate and can withdraw at any time during the study. Verbal assent will be obtained with each walking visit and you will have a choice to decline the walk if you are not feeling up to it. Your decision about whether or not to participate will not affect your care current or current care as a patient at Highland Hospital.

Contact Person

If you have any questions or concerns about this study, please do not hesitate to contact the Research Coordinator, Marie Bell at (585) 503-2987.

By signing this form, you acknowledge that you have read (or have had read to you) the contents of the consent form. You further confirm that you have been encouraged to ask questions and that they have been answered to your satisfaction. You have received (or will receive) a copy of this form for your records.

Study Subject: _________________________________ PRINT NAME
Study Subject: _________________________________ SIGNATURE
_________ DATE
PERSON OBTAINING CONSENT

I have read this form to the subject and/or the subject has read this form. An explanation of the research was given and questions from the subject were solicited and answered to the subject's satisfaction. In my judgment, the subject has demonstrated comprehension of the information. A copy of the signed consent form will be given to the subject.

_____________________________________________ PRINT NAME AND TITLE

_____________________________________________ SIGNATURE

__________ DATE
Appendix B

Hospital Admission Risk Profile (HARP)

1. Scoring range 0-5

A. Age

<table>
<thead>
<tr>
<th>AGE CATEGORY</th>
<th>RISK SCORE</th>
<th>SCORE =</th>
</tr>
</thead>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>75-84</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>≥85</td>
<td>2</td>
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</table>

B. Cognitive function (abbreviated MMSE)*

<table>
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<th>MMSE SCORE</th>
<th>RISK SCORE</th>
<th>SCORE =</th>
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</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>0-14</td>
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</table>

C. IADL function prior to admission**

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<th>SCORE =</th>
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</thead>
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2. Risk categories

<table>
<thead>
<tr>
<th>TOTAL SCORE</th>
<th>RISK OF DECLINE IN ADL FUNCTION</th>
<th>TOTAL =</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 or 5</td>
<td>High risk</td>
<td></td>
</tr>
<tr>
<td>2 or 3</td>
<td>Intermediate risk</td>
<td></td>
</tr>
<tr>
<td>0 or 1</td>
<td>Low risk</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C

Movement is Medicine: An Early Ambulation Program for Hospitalized Older Adults

DATA COLLECTION TOOL

Subject ID: ______________

Subject Age: ______

Subject Gender: _____ Male _____ Female

Race/Ethnicity:

_____ African American/Black  _____ Asian  ____Caucasian/White

_____ Hispanic/Latino  _____ American Indian/ Alaskan Native

_____ Pacific Islander/ Native Hawaiian  _____ Other _____ No Response

Marital Status

_____ Single _____ Married _________ Widowed _______ Divorced

_____ Separated _____ Singled but partnered ___Never married w/0 partner

Highest Educational Level Obtained:

_____ Elementary_____ Some HS ________ HS Diploma

________ Some College _____Graduate Degree (4 or more years)

Admitting Diagnosis:____________________________

Baseline HARP Score: _________

Walking Protocol: _____ 210 feet two times a day

Use of Assistive Device:

_____ None _______ Walker _______ Cane _______ Gait Belt _______ 1 Assist

Length of Stay: ______________
Discharge HARP Score: _______________

Discharge Destination:

_________Transferred _______Home ______ Family/ Friend ________Rehab_______
Skilled Nursing Facility ____ Assisted Living Facility ______ Expired

Issued Pedometer: _______Yes _______No
Appendix D

Letter to Provider

Dear Provider,

Your patient _______________________________________ has been chosen to participate in Movement is Medicine an early and structured ambulation study for hospitalized older adults. The purpose of this study is to evaluate if such a structured ambulation program will affect your patient’s functional status. A mobility specialist will assess your patients’ cognitive and ambulatory status using the Hospital Admission Risk Profile (HARP) as a measuring tool. Your patients will be walked daily until discharge. If at any time you feel that your patient needs to discontinue the walking exercises, the patient will be removed based on your request.

I consent to have the above patient participate in the Movement is Medicine-structured walking study. I understand that I can discontinue the ambulation activity at anytime during the patient’s hospitalization.

Signature of provider: ____________________________________________

Date_________________________________________
Appendix E

Dear Ms. Bell:

Thank you for submitting your research proposal to the Institutional Review Board. I am pleased to inform you that the Board has approved your Full Review project, “Movement is Medicine: An Early Ambulation Program for Hospitalized Older Adults.” The Board considers your project adequate to protect the rights and welfare of human subjects as well as meeting the standards for informed consent.

As principal investigator, you are responsible for promptly reporting (in writing), through your department head, the following:

☐ The location where the signed consent forms will be kept on file for a period of three years.
☐ Progress reports of the research will be sent to the Board annually. If the research is not concluded within a year’s time, you will need to petition the Board for a one-year renewal.
☐ Any injuries to human subjects.
☐ Any unanticipated problems that involve risks to the human research subjects or others.
☐ Changes in a research activity.
☐ Changes in research during the period for which the Board approval has already been given shall not be initiated by research investigators without the Board review and approval, except where necessary to eliminate apparent immediate hazards to the subject. In such occurrences, the Board is to be notified as soon as possible.

Following federal guidelines, research related records should be maintained in a secure area for three years following the completion of the project at which time they may be destroyed.

Should you have any questions about this process or your responsibilities, please contact me at 385-5262 or by e-mail to emerges@sjfc.edu or if unable to reach me, please contact the IRB Administrator, Jamie Mosca, at 385-8318, e-mail jmosca@sjfc.edu.

On behalf of the Board, I wish you success with your research project.

Sincerely,

Eileen M. Merges, Ph.D.
Chair, Institutional Review Board
Appendix F

FW: Research Study starts Monday SEPT 13th, 2010 Movement is Medicine.

Blue, Barbara A

Sent: Monday, September 13, 2010 2:11 PM
To: Bell, Marie J.

I think I forgot to send you a copy. bb

Barbara Blue R.N., C.R.R.N.
West 4 Department Manager
Phone: 585-341-8105
Fax: 585-341-8364

From: Fennessey, Chrisann
Sent: Monday, September 13, 2010 11:18 AM
To: Blue, Barbara A
Subject: RE: Research Study starts Monday SEPT 13th, 2010 Movement is medicine.

Looks like an awesome study. :-)

From: Blue, Barbara A
Sent: Saturday, September 11, 2010 10:30 AM
To: Hinton, Tommye; Harrington, Ann; Naim, Terri; Barratt, Jo; Belanger, Rachel; Caruana, Colleen; Coffey, Jen; Conroy, Kathleen D; Irvine, Karen; Mattia, Jessica; McGovern, Irene T; McManus, Jennifer L; Pape, Karin; Peterson, Kim D; Smith, Vicki; Volke, Laurie; Woldeabezgi, Yirga; wood, Sandra; Hayslip, Linda M; Adam, Sheila; Banker, Jericho; Barratt, Jo; Beeman, Karrie; Belanger, Rachel; Caruana, Colleen; Coffey, Jen; Conroy, Kathleen D; Cummings, Michelle; Dorn, Christine; Driessen, Jennifer; Duhart, Shansanotta J; Eiff, Jennifer; Fennessey, Chrisann; Gudonis, Marcia L; hartlieb, michele; Hughes, Elizabeth; Irvine, Karen; Johnston, Kathrina; Jost, Nancy J; Long, Tracy; Manning, Kerri; Mattia, Jessica; McGovern, Irene T; McManus, Jennifer L; Miller, Angie; Northrup, Caroline; Oatman, Carolyn L; Pape, Karin; Peterson, Kim D; post, Connie; Quait, Joanne L; Sahrle, Garrett; Smith, Vicki; Somers, Laura; Trau, Melissa; Volke, Laurie; Weisner, Traci; Woldeabezgi, Yirga; wood, Sandra; Barnes, Latasha R; Byrd, Tashelma; Dykeman, Judith; Latimore, Pasheena L; Perez, Donna (Nursing); Vanderkamp, Shawn; Visconte, Tracy; Wollschleger, Alicia W; HH Nurse Administration
Hello Ladies and Gentlemen of West 4.
An Update to our project.
Marie Bell  MSN, RN, GNP from St. John Fishers Executive Leadership program, will be here starting Monday September 13th to do begin her research study on Step it up a notch. Her schedule will be M-W-F here around 10 to interview and assess the patients who can be part of her study. She will observe interdisciplinary rounds and interact with the "Step it up a notch" program. Since she is not a Highland employee she can not help do the hands on walking. This will continue to be the Nurses and PCT's responsibility. Tuesdays and Thursdays she will be here after ~330pm again to collect her data and work with the program. She will start on this Monday with only new admission patients. Her goal is to get 25 people over the next three months. West 7 has agreed to be the control group with 25 of their patients.
I sent out in July the original research document to all of you to have read. I will resend the updated version on Monday for you to re-review.

**Study abstract:** determine the effects of a structured ambulation program in functional levels in hospitalized older adults.

**Inclusion criteria** are a pts over 65, Mini mental status test of greater that 15, English speaking or someone who can have an interpreter readily available, so they can consent. They needed to be amb. pre-adm. with or without and assistive device and our goal is to get them back to their prior level of home care. No history of prior falls. There will be notes on the front of the patients charts asking the doctors for approval for the patient to participate. They will need orders to be OOB ad lib or with assist- so may require residents to update orders.

**Unit Objectives:**

a.) West 4 will participate collaboratively in a EBP research project.
b.) All staff(RNs, LPNs, PCTs, SPCTs and Unit secty.) will be educated on the methodology of research at the bedside.
c) to determine if our one of a kind program helps to promote and prevent functional decline in our population.

Please welcome Marie and support this great project. Any questions please let me know.

Barb Blue RN, CRRN
West 4 Department Manager.
Appendix G

RE: HH Nursing Research and EBP Council review Motion is the Medicine

GartonPark, Betsy

You replied on 8/24/2010 8:14 AM.

Sent: Wednesday, August 18, 2010 10:13 AM

To: Bell, Marie J.

Thanks Marie!

Betsy Garton-Park BSN RN CPAN
pager: 275-1616 - page ID 81484
Nursing Research and Evidence Based Practice Council Chair
Precept Coordinator Critical Caring Service Line
Highland Hospital University of Rochester Medical Center Affiliate
Rochester, NY 14620
585-341-6708
betsy_gartonpark@urmc.rochester.edu
Nurses live caring uniquely

From: Bell, Marie J.
Sent: Tuesday, August 17, 2010 11:05 AM
To: GartonPark, Betsy
Subject: RE: HH Nursing Research and EBP Council review Motion is the Medicine

Hi Betsy

I will be there with bells on.

Marie

From: GartonPark, Betsy
Sent: Thursday, August 12, 2010 12:02 PM
To: Bell, Marie J.
Subject: RE: HH Nursing Research and EBP Council review Motion is the Medicine

Hi Marie,

I am hopeful that you will be attending our council meeting this Weds. August 18.

Thanks

Betsy

Betsy Garton-Park BSN RN CPAN
pager: 275-1616 - page ID 81484
Nursing Research and Evidence Based Practice Council Chair
Precept Coordinator Critical Caring Service Line
Highland Hospital University of Rochester Medical Center Affiliate
Rochester, NY 14620
585-341-6708
betsy_gartonpark@urmc.rochester.edu

Nurses live caring uniquely

-----------------------------------------

From: GartonPark, Betsy
Sent: Thursday, July 22, 2010 1:44 PM
To: Bell, Marie J.
Hi Marie,

So sorry you were unable to come to our meeting.

We will put you on for August 18th @2pm in the Calihan conference room.

Thanks

Betsy

Betsy Garton-Park BSN RN CPAN

pager: 275-1616 - page ID  81484

Nursing Research and Evidence Based Practice Council Chair
Precept Coordinator Critical Caring Service Line
Highland Hospital University of Rochester Medical Center Affiliate
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Nurses live caring uniquely

Appendix H

Explanation of Power Analysis
When alpha=.01 and Beta=.05 (Power=1-Beta=1-.05=.95), the general formula for the sample size, \( n \), can be written

\[
n = \left[ \frac{2.32 - (-1.645)}{(\mu_1 - \mu_0)} \right]^2 \]

where \( \mu_1 \) is the mean for the alternative hypothesis and \( \mu_0 \) is the mean for the null hypothesis.

You should be thinking, if my sample size is 50, \( n=50 \), and I want a power of .95 and a significance level of alpha=.01, just how far away can my hypothesized mean, \( \mu_0 \), be from my alternative mean, \( \mu_1 \), in order to maintain \( \mu_0 \); i.e., and still maintain or preserve the power level.

\[
\mu_0 - \mu_1 = \mu_0 - \mu_0
\]

Let \( \mu_0 - \mu_1 = \mu_0 - \mu_0 \), then we have

\[
n = \left[ \frac{2.32 - (-1.645)}{(\mu_1 - \mu_0)} \right]^2 = \left[ \frac{2.32 - (-1.645)}{\mu_0} \right]^2 = \left[ \frac{3.965}{\mu_0} \right]^2
\]

And this implies,

\[
\mu_0 - \mu_0 = \frac{(3.965)(\sigma)}{\sqrt{n}}
\]

So, if \( n=50 \), then we have

\[
\mu_0 - \mu_0 = \frac{(3.965)(\sigma)}{\sqrt{50}}
\]

\[
\mu_0 - \mu_0 = \frac{(3.965)(\sigma)}{7.07} = .56\sigma
\]
Which means that for a sample size of 50, \( n=50 \), you have the ability to detect a difference half a standard deviation away between your means, \( \mu_d \), with a power of .95 for the given alpha significance level of .01, \( \alpha=.01 \).