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Characteristics of the Middle-Age Adult Inpatient Fall: A Dissertation

Item Type	Doctoral Dissertation
Authors	Guillaume, Donna M.
DOI	10.13028/dcjp-ps31
Publisher	University of Massachusetts Medical School
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Download date	2025-05-16 18:06:57
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Link to Item	https://hdl.handle.net/20.500.14038/34383

Characteristics of the Middle-Age Adult Inpatient Fall

A Dissertation Presented

By

Donna M. Guillaume

Submitted to the Graduate School of Nursing
University of Massachusetts Worcester
In partial fulfillment of the requirements for the degree of
Doctor of Philosophy
Nursing

August 2015

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University of Massachusetts Worcester

Graduate School of Nursing

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Acknowledgements

This was not a professional journey taken alone. (*Author unknown*) “*Because you believed in me, I believed in me.*” Thank you to Ellen Felkel-Brennan, your encouragement and example gave me the motivation to apply for the PhD program and the strength to persevere. Lynn D’Esmond, Marion Giammarinaro, Laura Maguire, and Paula Moreau these special women were there each day, cheering me on and picking me up when the journey got tough. To all my classmates, you are amazing individuals that exemplify what is to be a nurse. I am honored to have attended the Graduate School of Nursing and thank all my professors who provided me the tools necessary to complete my research. I want to extend a special thank you to Dr. Jean Boucher my Dissertation Chair, for your ongoing support, mentorship, and belief in me. To my dynamic committee members Dr.’s Carol Bova, Sybil Crawford, and Patricia Quigley. Thank you for your time, expertise, and support. I was blessed to have you. Finally, I would like to thank my husband Ron and daughter Julie who are the wind beneath my wings. It was your love, understanding, and faith in me, that gave me the courage and determination to make this dissertation a reality.

Table of Contents

	Page
Committee Members Signed Dissertation Title Page.....	iii
Acknowledgements.....	iv
Abstract.....	vi
Dissertation Proposal July 9, 2014: <i>Fall Injury in the Middle-Age Adult Patient</i>	1
Appendix A. Interview Guide.....	45
Appendix B. Demographic Data Sheet.....	46
Appendix C. Study Fact Sheet.....	48
Appendix D Secondary Data Collection.....	49
Executive Summary.....	52
Dissertation Defense Slide Presentation August 26, 2015: <i>Characteristics of the Middle-Age Adult Inpatient Fall</i>	53
Dissemination Plan.....	85

Abstract

Falls remain one of the most reportable, serious and costly type of adverse events costing an estimated \$3,500 to \$27,000 depending on the injury. The research often focuses on the elderly and their risk for falls and injury. Increasingly higher rates of falls are being reported in the middle-age inpatient 45 to 64 years of age. While predictors of falls and injuries have been studied across all adult inpatients, research has not specifically addressed fall risk characteristics in the middle-age. The World Health Organization's (WHO), "*Risk factor model for fall in older age*", framework was adapted for the middle-age inpatient. This framework identifies extrinsic and intrinsic variables from four risk factor groupings of biological, socioeconomic, behavioral, environmental and related outcomes to describe characteristics of the middle-age inpatient's fall injury risk. Hitcho et al. (2004) seminal article was also used to identify pertinent inpatient characteristics. The purpose of this exploratory retrospective quantitative study described fall risk factors specific to the middle-age inpatient. The aims: (1) described risk factors of falls and fall injury; (2) described unit specific data, fall numbers with type of falls, injuries from falls, and prevention strategies (3) compare the incidence of fall and injury rates in the middle-age (45-64) patients to the other hospital adult age-groups (ages 21-44 and 65-90). This study used Retrospective hospital occurrence data to identify middle-age inpatient falls and related characteristics reported by staff. Chart review of inpatient falls identified 439 individual falls occurring from January 2012 through July 2014. The study sample included inpatients that fell either one-time or had a repeat fall during the study period. Analysis for data included use of descriptive statistics, crosstabs, and Poisson regression. Outcomes collected included demographics, admitting diagnosis, chief complaints, cormorbities, and discharge status, type of falls and areas of falls. There was no significant difference in rates of falls between units or in

staffing ratios that had a bearing on the middle-age inpatient. Fall prevention interventions were found to be universally applied, not specific to the individual, nor based on outcomes of risk screening of anticipated physiological risk factors. In comparison of the middle-age inpatient population with those age 65 -90 years of age the rates per 1000 patient days for both falls ($p=.637$) and injuries ($p=.626$) had no significant difference. Males fell at a significantly higher rate ($p=.000$) than females in the middle-age inpatient and those aged 64-90 years. The middle-age inpatient fell at an alarming rate of 42% of all falls.

This research provided insight into a population with acute and multiple chronic disease conditions and comorbidities that contribute to altered mental status, abnormal gait and frequently awaking at night to void. This population often overestimates their limitations and strives to maintain their autonomy. The age of the patient should not influence staff assessment of alertness and orientation. The findings of the characteristics in this research provide rich information for further research in how to include the middle-age patient in clinical decision making and education of this age group.

Fall Injury in the Middle-Age Adult Patient

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July 9, 2014

Introduction

Falls with injuries remains one of the most reportable, serious, and costly type of adverse events that occur in United States (U.S.) hospitals resulting in morbidity and mortality outcomes (CMS, 2012; Mion et al., 2012; Oliver, Healey, & Haines, 2010; 2013; Sand-Jecklin & Sherman, 2013). In acute care, an estimated 1000 falls per hospital occur each year regardless of their size; with over one million inpatient falls reported nationally (Oliver et al., 2010; Shorr et al., 2008; Wu, Keeler, Rubenstein, Maglione, & Shekelle, 2010). Patient injuries occur in 30%-51% of all fall-related events (Bradley, Karani, McGinn, & Wisnivesky, 2010; Oliver et al., 2010; Quigley & White, 2013). Types of injuries range from minor bruises and lacerations to head trauma and fractures, with 1% as fall-related deaths (Currie, 2008; DiBardino, Cohen, & Didwania, 2012; Hitcho et al., 2004; Mion et al., 2012; Oliver et al., 2010).

The National Quality Forum (NQF) classified injuries resulting from falls as one of 29 “never events”. These are adverse events considered preventable that should not occur during a hospitalization. Injuries from falls can result in increased morbidity and mortality (AHRQ, 2012; Quigley & White, 2013). The Centers from Medicare and Medicaid (CMS) identified falls as one of 11 hospital acquired conditions that it no longer reimburses for care associated with the injuries related to falls (Bouldin et al., 2013; CMS, 2012). According to The Joint Commission reporting of sentinel events in 2013, an inpatient fall with injury or death remains in the top five reportable events (TheJointCommission, 2014).

Fall-related injuries result in higher cost (Mion et al., 2012; Stalhandske, Mills, Quigley, Neily, & Bagian, 2008; Weinberg et al., 2011), increased patient length of stay (Miake-Lye, Hempel, Ganz, & Shekelle, 2013; Mion et al., 2012; Weinberg et al., 2011), short or long-term rehabilitation including nursing home placements (Bradley et al., 2010; Tzeng, Hu, & Yin, 2011; van Harten-Krouwel, Schuurmans, Emmelot-Vonk, & Pel-Littel, 2011) and the risk for

malpractice lawsuits (Boltz, 2009; Mion et al., 2012; Weinberg et al., 2011). Falls cost hospitals \$3500 for a non-injury to \$30,000 for a single serious injury (Halm & Quigley, 2011; Harrington et al., 2010; Quigley & White, 2013).

While patients age 65 and older are at greater risk for falls and injury, higher fall rates are being seen in the middle-age adult population (Mion et al., 2012; T. Williams, Szekendi, & Thomas, 2014). Fall monitoring at an academic teaching hospital in Worcester, Massachusetts revealed that 40% of patients who fell were between the ages of 45-64 (UMMMC Occurrence Report Data Base, 2014). These findings suggest that there is a need to look more closely at falls in the middle-age population. Middle-age, as defined by Merriam-Webster's on-line dictionary is the "period of life from about 45 to 64" (Merriam-Webster's Dictionary, 2014) years of age.

The middle-age population according to the US Census Bureau makes up 27% of the inpatient census having increased by 31% since the 2000 census ("U.S. Census Bureau," 2012). In addition, this population has shown an increase in health issues usually associated with patients over 65 years of age as evidence by an increase from 23% to 29% of patients being admitted for Congestive Heart Failure (CHF)(often a result of hypertension, diabetes and coronary artery disease) (Hall, Levant, & DeFrances, 2012).

The challenge regarding fall injury prevention for the middle-age population is based on age (not elderly but younger) and cognitive status (not confused but alert), where nurses often do not consider or assess this population as being at risk for falls (T. Williams et al., 2014). In addition, when educating these patients on their fall risk factors, nurses may fail to consider a patient's lack of perceived or actual physical limitations due to their acute illness (Tzeng, 2011b), which could result in an anticipated fall. Fall prevention for the middle-age patient

includes balancing risk from fall injury with the patient's need to maintain mobility, and respect for the patient's autonomy (Healey, 2011; Oliver et al., 2010).

The current literature review describes issues related to fall prevention strategies that include risk factors, prevalence, and the types of injuries, along with interventions strategies mainly associated with older adults (Bradley et al., 2010; Clyburn & Heydemann, 2011; Oliver et al., 2007; Quigley et al., 2009; Titler, Shever, Kanak, Picone, & Qin, 2011). Oliver et al. (2010) utilizing systematic and meta-analysis found most intervention studies were performed with older patients with a mean length of stay of 19 days or more. Hitcho et al.'s (2004) study described the characteristics of 183 inpatients who fell and found that 47% ($n=86$) were under age 65. However no research could be found that specifically focused on falls in middle-aged inpatients (Dykes, 2012; T. Williams et al., 2014). Therefore, the purpose of this study will be to identify factors that lead to falls in adults ages 45-64 and to understand from the patient's perspective their view of why they fell. The results may inform nurses and the multi-disciplinary team on how to provide information on fall injury risk to patients and individualize patient specific care to decrease falls and related injuries in the middle-age population (Dykes, 2012; Quigley et al., 2009).

The specific aims of this study are to:

1. Describe fall and fall injury risk factors that are specific to the middle-aged (ages 45-64) hospitalized adults;
2. Explore the relationship between unit specific data, fall numbers, type of falls, injuries from falls, staffing ratios and prevention strategies used;
3. Determine the prevalence of fall and injury rates in the middle-age patient compared to the overall hospital adult population ages 21-44 and 65-90;

4. Describe the middle-age patient's perception of fall risks including accidental and anticipated risks and prevention strategies.

Background

Prevention of inpatient falls, including the injuries associated with falls, remains as important in 2014 as when first identified by the Institute of Medicine fifteen years ago (IOM, 1999). In 2005, The Joint Commission (TJC) introduced the National Patient Safety Goal requiring hospitals to implement a fall reduction program to reduce harm from falls (TJC, 2005). In 2010, TJC upgraded this requirement to be a standard for hospitals requiring evaluation of the effectiveness of fall-reduction activities that include "assessment, interventions and education"(Forte, 2011, p. 2).

It is well documented that older adults are at high risk for falls and that the injuries associated with these falls can result in permanent disability or even death (Bradley et al., 2010; Clyburn & Heydemann, 2011; Oliver et al., 2007; Quigley et al., 2009; Titler et al., 2011). Despite the research and work directed toward fall prevention programs, patients continue to fall (Mion et al., 2012; Tzeng et al., 2011) with more than one million inpatient falls reported annually in the United States (Currie, 2008). The average hospital fall rate is over 1000 patients yearly (Oliver et al., 2010) while between approximately 2% to 20% inpatients will experience a fall during their hospitalization (Bradley et al., 2010; Clyburn & Heydemann, 2011) or 4 to 12 patient falls per 1,000 bed days per year (Clyburn & Heydemann, 2011; Cozart & Cesario, 2009). Approximately 30% of inpatient falls' result in some type of injury (Bradley et al., 2010; Miake-Lye et al., 2013; Tzeng, 2010). Serious fall-related injuries occur in 3.8%-10% of inpatients resulting in hip fractures, subdural hematomas, and death in 1% of cases (DiBardino et al., 2012; Hitcho et al., 2004; Mion et al., 2012; Oliver et al., 2010).

The average morbidity and mortality related cost from each fall is between \$15,000 and \$30,000 per hospitalization (Harrington et al., 2010). As a result, the cost of healthcare increases by \$1.08 billion annually (Harrington et al., 2010). Adding to the burden of this additional cost, CMS does not pay for inpatient care of a serious injury as a result of a fall (Quigley & White, 2013). Further underscoring this cost burden, a significant reduction in fall rates or associated cost burden has not been shown despite the Center for Disease Control and Prevention (CDC) spending approximately \$25 million dollars on research related to reducing falls over the last two decades (Zuyev, Benoit, Chang, & Dykes, 2011). When looking at the adverse events related to falls and costs, additional factors that are important components of error reduction include staffing ratios (Kalisch, Tschannen, & Lee, 2012; Tzeng et al., 2011), nurse's knowledge of risk and interventions (Oliver et al., 2010), communication (Quigley, Neily, Watson, Wright, & Strobe, 2007) and the institution's safety culture that supports continuous quality improvement (Lopez, Gerling, Cary, & Kanak, 2010; Spoelstra, Given, & Given, 2012).

The CDC describes a fall as “when a person unintentionally comes to rest on the ground or another lower level” (Stevens, Mack, Paulozzi, & Ballesteros, 2008, pp. 225-229). The National Database of Nursing Quality Indicators® (NDNQI®) (2013) further defines falls “sudden, unintentional descent, with or without injury to the patient, that results in the patient coming to rest on the floor, on or against some other surface (e.g., a counter), on another person, or on an object (e.g., a trash can) (p. 2). Falls also include patients who slip from a chair, are found on the floor, or who self-report a fall occurrence (NDNQI, 2013). The greatest difficulty in determining the cause of patient falls is that 77%-90% of falls are often unwitnessed (Oliver et al., 2010; Tzeng & Yin, 2008) in the hospital setting.

The Middle-Aged Patient

The middle-age adult is going through a transition time from early to older adulthood (Neugarten, 1979). This population deals with the challenge of getting older. Women are experiencing menopause causing changes in their hormones that affect both their body and moods (Clothier, 2004), while men face increase awareness of limitations with physical activity (Calasanti, Pietila, Ojala, & King, 2013). During this period of time, what was once physically easy to accomplish now takes more energy (Levinson, 1986). Both males and females are reflective of where they are in life as individuals. They face an age-related conflict of the contradiction between the need to control personal responsibilities with acceptance of physical changes which cannot be controlled (Calasanti et al., 2013). A qualitative study of 9 adult men ranging in age from 40-58 years old, supported this finding that middle-age men experience tension in coming to terms with control, personal responsibility of health, and dealing with an aging body (Calasanti et al., 2013).

The current middle-age generation has experienced the Vietnam era, and the generational changes of the 1960's. The middle-age is a time of "generativity or stagnation" where this population has either found success in career, home and community or becomes self-absorbed in feeling an intense pressure to change (Clothier, 2004). This generation is dealing with the stress of maturing children and aging parents (Levinson, 1986; Miller, 1981). The middle-age adult is at the most independent phase of their life cycle while also beginning to face their own aging process (Clothier, 2004; Levinson, 1986; Miller, 1981). They are often experiencing changing health with increase co morbidities, medication use, and decrease physical activity (Talbot, Musiol, Witham, & Metter, 2005). Understanding interactions of stress with illness and a

patients perceived need for autonomy, may influence ability to comply with a treatment plan, such as waiting for proper assistance to prevent falls.(Clothier, 2004).

Patients striving to maintain independence and not wanting to lose their sense of ability to function was supported in a qualitative study by Carroll et al. (2010) of 9 patients with a mean age of 61.2 years who fell. Patients discussed reasons of the need to toilet while experiencing a loss of balance and unexpected weakness. They described standing, becoming dizzy, and losing their footing, not thinking they would be as weak as they were. They did not associate their illness or surgery with a decrease in strength which could then contribute to a fall occurrence. They also described not having a call light answered or not wanting to bother the nurse as reasons for their getting out of bed without assistance (Carroll et al., 2010). Fagerström et al. (2014) identified that patient's strive for autonomy, preserving control to maintain some normality along with preserving freedom of choice. For an otherwise cognitively intact middle-age patient, the need for autonomy, to be as independent in physical function as possible when hospitalized, may contribute to accidental, unanticipated fall occurrences.

Hallstrom & Elander (2001) interviewed 20 patients (10 men and 10 women with a mean age of 62) and asked them to describe what their basic needs were during their hospitalization. They were grouped into “communication, basic care, contact with other people, behavior of staff members, empathy, competent caregivers, continuity, integrity, participation in decision making and pain relief” (Hallstrom & Elander, 2001,p. 8). This cohort indicated that they make sure their needs are met by seeking out the medical staff , or by, finding their own solutions due to not wanting to bother the staff (Hallstrom & Elander, 2001)

A retrospective quantitative analysis conducted by T. Williams et al (2014) of the University HealthSystem Consortium (UHC) Patient Safety Data of 25,010 patients, identified

the greatest number of falls were in 51-60 year old patients ($n=5561$). Two recent fall prevention studies also identified a gap in successful implementation of interventions to prevent falls in the middle-age patient group (Dykes et al., 2010; Tzeng, Titler, Ronis, & Yin, 2012). Dykes et al.'s (2010) randomized control trial to determine the effectiveness of using an electronic fall prevention toolkit (FPTK) in 192 patients with 88 patients age 64 years old or younger, found that the middle-age adult was less likely ($p=.003$) to adhere to the fall prevention interventions recommended. An exploratory study by Tzeng et al. (2012) of 1063 patients also identified that units with patients under age 65 had a higher fall rate compared to units with a census of older age patients.

Literature Review

Etiology

T. William's et al.'s (2014) descriptive analysis of UHC 2010 fall data of ($N=25,510$) reported that the greatest number of falls occurred on medical surgical units ($n=8131$, 36%) with the next highest percentage at 25% ($n=5804$) occurring in specialty acute care areas such as cardiac, oncology, and orthopedics. Patient transfers from either a bed or chair account for 50% - 70% of falls (Oliver et al., 2010), with 79.5%-85% occurring in the patient's room (Hitcho et al., 2004; Krauss et al., 2007; Lohse et al., 2012). Use of bathrooms, commodes or urinals results in 30% -61% of falls (Hitcho et al., 2004; Lohse et al., 2012; Tzeng, 2010; T. Williams et al., 2014). A prospective study by Hitcho et al. (2004) of 183 patient falls found of 27 patients who were assisted to a commode and left alone, 30% ($n=8$) fell when attempting to get up unassisted. Fisher et al.'s. (2005) retrospective analysis of 1,235 inpatient falls found that 248 of the falls occurred in patients between the ages of 50 and 64; including 26.6% ($n=17$) of this population experiencing a moderate to severe injury.

The number of inpatient falls and the time of day that falls occur have also been studied. A retrospective cohort study by Kraus et al. (2007) found that among 7,082 hospitalized inpatients 82.5 % ($n = 5,841$) fell once during the study period and 17.5% ($n= 1,241$) fell more than once. Similar to these findings, Bradley et al. (2010) found that 19% ($n=95$) inpatients had multiple falls during their present hospitalization or in repeat hospitalizations. Oliver et al. (2010) found time of day falls occurred was not consistent in studies reviewed.

Risk Factors

A patient's risk to fall has been found to be multifactorial and includes both intrinsic and extrinsic elements (Clyburn & Heydemann, 2011; Naqvi, Lee, & Fields, 2009; Oliver et al., 2010). *Intrinsic* elements are those factors endogenous to the patient (Oliver et al., 2010) that need to be considered when developing an individualized plan of care for safety. Factors to consider include age, race, sex, fall history, and comorbidities (Clyburn & Heydemann, 2011). Additional factors include balance disorders, change in mental status, delirium, muscle weakness, postural hypotension, agitation, urinary incontinence (Hitcho et al., 2004; Oliver et al., 2010; T. Williams et al., 2014) and use of high risk medications such as sedatives, psychotropic and benzodiazepines (Naqvi et al., 2009). T. Williams et al.'s (2014) review of 2010 UHC data also found that dizziness or vertigo was an intrinsic element in 10% ($n=2551$) of falls. Both men and women are susceptible to falls in the inpatient setting. The literature is not consistent that one sex has a higher significant incidence rate (Bradley et al., 2010; Dykes et al., 2010; Fischer et al., 2005; Hitcho et al., 2004; T. Williams et al., 2014).

A recent study identified that middle-aged patients 51-60 years old had the highest reported fall rates, followed by patients age 61-70 years (T. Williams et al., 2014). Tzeng et al.'s (2008) study of 101 falls reported a mean age of 58.59 years ($SD=18.13$; range 24.51- 94.21) in

patients who fell. A retrospective study by Mion et al. (2012), found of 784 patients who fell during a 26 month period of time that the median age was 63.5 years and the mean age was 63.3 years. Similarly, Hitcho et al. (2004) found that among 183 patients who fell in the hospital their mean age was 63.4 years with 47 % ($n= 86$) under the age of 65.

Extrinsic fall risk factors are those risk factors external to the patient, such as medication and other factors that can be controlled related to maintaining patient safety and preventing injuries in the hospital environment. These factors include clutter, floor surfaces such as torn carpets, uneven thresholds and scatter rugs, poor lightening, IV poles, placement of catheters, lack of grab rails, height of beds, and inadequate assistive devices (Clyburn & Heydemann, 2011; Naqvi et al., 2009; Tzeng & Yin, 2008). Tzeng et al. (2008) identified extrinsic risk factors from The Joint Commission's (2005) findings that include "inadequate staff communication and training, incomplete patient assessments, environmental issues, incomplete care planning and inadequate organizational culture of safety" (p. 234).

Patients intrinsic risks associated with falls that include vision problems, muscle weakness, and restlessness are often compounded by medications, unfamiliar environment, poor lighting, chair heights, tubing, and clutter (Oliver et al., 2010). When assessing a patient's risk to fall, staff often do not account for the effect of a strange environment on fall occurrence or a patient's tendency to ignore their physical limitations (Tzeng, 2011b). This was captured in a qualitative study by Rush (2009) in the following patient's response, "I have done this at home a million times," "I am not going to fall" (Rush, 2009, p.361).

Fall-risk injury severity

When a fall occurs depending on the severity of injury, it can change a patient's recovery and discharge. The National Database for Nursing Quality Indicators (NDNQI) (NDNQI, 2013,

pp. 5-6) identified injuries based on 5 categories (see Table 1). Halm & Quigley (2011) recommends a population specific approach to fall injury reduction by identifying the presence of “ABCS” factors (Age >85 years, Bones, osteoporosis diagnosis or treatment, history of fracture, especially hip fracture; Coagulation, anticoagulant therapy; Surgery, recent major abdominal, thoracic, or lower extremity)”(p. 482) in patients that if present increase risk for injury when a fall occurs.

Table 1.

Injury Level

None	Resulted in no signs or symptoms of injury as determined by post-fall evaluation (which may include x-ray or CT scan)
Minor	Resulted in application of ice or dressing, cleaning of a wound, limb elevation, topical medication, pain, bruise or abrasion
Moderate	Resulted in suturing, application of steri-strips or skin glue, splinting, or muscle/joint strain
Major	Resulted in surgery, casting ,traction, required consultation for neurological or internal injury, or patients with any type of fracture, or patients who have coagulopathy who receive blood
Death	The patient died as a result of injuries sustained from the fall (not from physiologic events causing the fall)

Type of falls.

Intrinsic or extrinsic risk factors, type of injuries and severity of injuries still do not provide a comprehensive understanding of patient falls. Morse (2002) suggested that falls be further classified as “accidental, unanticipated physiologic, or anticipated physiologic” (p. 376) providing categories in which interventions can be directed (Quigley & White, 2013; Stalhandske et al., 2008). (See Table 2)

Table 2.

Type of Falls

Accidental falls	Extrinsic environmental factors such as clutter, wet floors from a spill or urine, leaning on bedside tables, and tripping over a threshold going in or out of a bathroom or patient room, on cords and IV poles (Morse, 2002).
Anticipated physiological	Intrinsic factors such as medications, vision problems, gait disturbances or cognition (Morse, 2002).
Unanticipated physiological falls	Not preventable and occur due to factors that could not be predicted such as fainting, stroke, syncope, heart attack, seizure, or a pathological fracture (Halm & Quigley, 2011; Morse, 2002)
Intentional (Behavioral) falls	Occur due to patients’ intentional behavior to throw themselves on the floor Quigley et al. (2011)

Anticipated falls account for 78% of all inpatient falls (Morse, 2002). When properly identified as anticipated falls, the nurse can apply interventions that are tied to the etiology of the fall (Morse, 2002). Use of a validated fall risk assessment tool such as the Morse score (Morse, 2006), STRATIFY (Oliver, Britton, Seed, Martin, & Hopper, 1997), and Hendrich I and II (Hendrich, Bender, & Nyhuis, 2003) for patients is recommended for use to identify anticipated versus accidental falls.

Prevention

Some falls are not preventable (DiBardino et al., 2012; Healey, 2011; Mion et al., 2012) but prevention of injury due to falls is an important concern for nurses and health care organizations (Mion et al., 2012; Morse, 2002; Quigley & White, 2013). Comparing empiric evidence from fall prevention research is difficult due to the lack of uniformity on type of studies, ability to compare effective intervention used. Oliver et al. (2010) suggest that although research has not identified a prevention program to eliminate falls, we need to use the “best available evidence” (p. 650) to keep patients safe from fall injuries. Fall prevention strategies important for patient safety include interventions related to patient fall-risk assessment, patient education related to fall prevention and a safe environment that is free of clutter and provides adequate lighting (Neily, Howard, Quigley, & Mills, 2005; Spoelstra et al., 2012). Successful fall prevention programs require a patient safety culture that promotes trust, cooperation and open communication (Quigley & White, 2013; Weinberg et al., 2011) and involves cooperation and inclusion of other disciplines (e.g. physician, pharmacists, physical therapists and housekeeping staff) (Healey, 2011; Oliver et al., 2010; Quigley & White, 2013).

Even with the plethora of research findings published, there remains no single intervention, multifactorial approach, or other components such as a culture of safety that can

sustain a decrease in fall injuries (Johnson, George, & Tran, 2011; Kalisch et al., 2012; Lopez et al., 2010; Mion et al., 2012; Oliver et al., 2010; Spoelstra et al., 2012; Tzeng, 2011a). A Cochrane Review meta-analysis of inpatient hospitals studies looking at appropriate evidence-based interventions for fall prevention was inconclusive in recommending a single intervention to reduce falls (Clyburn & Heydemann, 2011; DiBardino et al., 2012; Oliver et al., 2010; Spoelstra et al., 2012).

Single interventions. Oliver et al. (2010) suggest that interventions be targeted to specific risk factors identified by a validated fall risk tool. A patient assessment had been performed in 74-88% of inpatient falls (Bouldin et al., 2013; Bradley et al., 2010; Mion et al., 2012; T. Williams et al., 2014). When a validated tool was used, 73.9 %-80% were identified at risk to fall (Bouldin et al., 2013; Bradley et al., 2010; Mion et al., 2012; T. Williams et al., 2014). However, no single validated assessment tool has been proven to be successful in identifying patients at risk to fall and when used alone is unlikely to decrease falls. Table 3 identifies single interventions commonly cited in the literature. (Cameron et al., 2010; Oliver et al., 2010; Quigley & Goff, 2011; Spoelstra et al., 2012; T. Williams et al., 2014).

Table 3.

Single Interventions

Toileting programs	Beds in low position
Footwear	Gait belts
Fall identification arm bands	Assistive devices
Signage to call before falling	Medication review
Nonskid socks	Hourly rounding
Rooms with close proximity to staff	Exercise promotion
Bed and chair alarms	Delirium management

Education of staff, patients, and family using written information has been found to have success on fall rates (Dykes et al., 2010; Oliver et al., 2010; Spoelstra et al., 2012; B. Williams, Young, Williams, & Schindel, 2011). Prevention of falls requires the nurse, the multidisciplinary staff along with the patients and family to understand the patient's risk factors. Use of "teach back" by nurses to evaluate patient's understanding of fall risk has been shown to be an effective intervention for fall prevention (Butcher, 2013; Halm & Quigley, 2011). An RCT (N=1206) of cognitively intact patients who received multimedia and staff follow-up versus low-cost educational handouts reported a 50% reduction in falls when education was provided by health care professionals (Haines et al., 2011; Oliver et al., 2010). Tzeng & Yin's (2013) descriptive study of 560 RN's, 87% (n=488) also identified staff education as important for fall prevention as one of their 16 common themes. B. Williams et al.'s (2011) quasi-experimental study provided 87 nurses with education where 364 falls that occurred before the education session were reduced to 62% (n= 108) when analyzed one year after the study's education completion.

Restraints, as a single fall intervention, should be avoided due to increased risk of patient harm (Miake-Lye et al., 2013; Oliver et al., 2010). Another single intervention that has had little evidence to support success for fall reduction is sitter use as an alternative to physical restraints (Oliver et al., 2010; Tzeng, Yin, & Grunawalt, 2008).

Multifactorial interventions. Evidence-based fall prevention interventions that use a multifactorial approach have shown varying degrees of success (Oliver et al., 2010; Spoelstra et al., 2012). Many inpatient units employ a form of universal fall precautions to ensure basic safety. The interventions associated with universal fall precautions include the fall-risk assessment, use of call lights within reach, an environment well lighted and free of clutter, education of patient and family, and hourly rounding (Halm & Quigley, 2011; Neily et al., 2005;

Spoelstra et al., 2012). Other components of evidence-based fall prevention programs include a patient-centered care environment that supports a culture of safety, incorporates post-fall safety huddles or follow-ups, use of technology toolkits (Dykes et al., 2010; Quigley et al., 2009; Spoelstra et al., 2012), use of teach back (Quigley et al., 2009), handoff communication and use of nationally provided toolkits developed by experts in fall prevention and organizational change (AHRQ, 2013; Clancy, 2013).

The literature has not always provided evidence-base support for interventions commonly used in hospital's fall prevention programs. A clustered randomized trial of 27,672 inpatients found no significant improvement in fall rates per 1000 patient-days (Shorr et al., 2012) with bed alarm use. Use of bed rails as an intervention to keep patients from falling out of bed has been responsible for an increase risk in fall injury (Hignett & Masud, 2006; Oliver et al., 2010). Commonly used patient fall risk bed signs are often not removed between patients (Hempel et al., 2013). Oliver et al. (2010) identified an RCT of 18 Australia hospital wards use of low beds found that they did not reduce fall injury rates when compared with control wards. Interventions should be based on risk factors specific to the individual patient (Clancy, 2013; Shorr et al., 2012). When implementing interventions into a plan of care, it is important to assess evidence-based knowledge of individual interventions (Quigley, 2013).

Conceptual Framework

The guiding framework for this study is the World Health Organization's (WHO), "*Risk factor model for fall in older age*" (WHO, 2007). This model was originally conceptualized to provide a framework for developing interventions for fall prevention in the older adult living in the community. The World Health Organization (WHO) developed "*The Global Report on Falls Prevention in Older Age*" based on recommendations from a conference held in February 2007

(World Health, 2008). This report brought attention to the prevalence of falls in the older age population and provided a framework to use for development of interventions for the prevention of falls.

To understand why the older adult in the community falls, four dimensions were used for analysis of an individual's risk for fall with the theoretical premises that the greater the exposure to fall-related risk factors, the greater opportunity for patient injury from falls (World Health, 2008) The risk factors were grouped into biological (e.g., age, gender, physical cognitive chronic illness), behavioral (e.g., medication use, excess alcohol, lack of exercise), environmental (e.g., building design, wet floors, loose rugs, lighting, cracked sidewalks) and socioeconomic (e.g., low income, housing, social interactions access to health services) domains. These factors alone were not seen as the cause of a fall but the interaction with other factors within the model increased the risk for falls and falls with injury (World Health, 2008).

This model will be adapted for use in the inpatient setting using characteristics based on findings from an earlier prospective descriptive study of inpatients from ages 17-96 years by Hitcho et al. (2004). The four risk factor groupings biological, socioeconomic, behavioral and environmental characteristics and circumstances identified in this study will provide guidance to study inpatient fall risks of the middle-age adult. (See Figure 1)

In addition the model is adapted to include the metaparadigm of nursing with the multidisciplinary team. Successful fall and injury prevention involves operationalizing concepts central to the metaparadigm of nursing. This model suggests that nursing with the multidisciplinary team, patient-centered care, health, and the environment influence outcomes and prevention based on specific patient interventions. The WHO Global Report on Fall Prevention (WHO, 2007) identified that fall prevention relies on awareness, assessment and

interventions. The aims of this study will be to bring awareness of the risk factors specific to this middle-age population to guide future design and implementation of evidence-based interventions for the purpose of reducing falls and fall-related injuries.

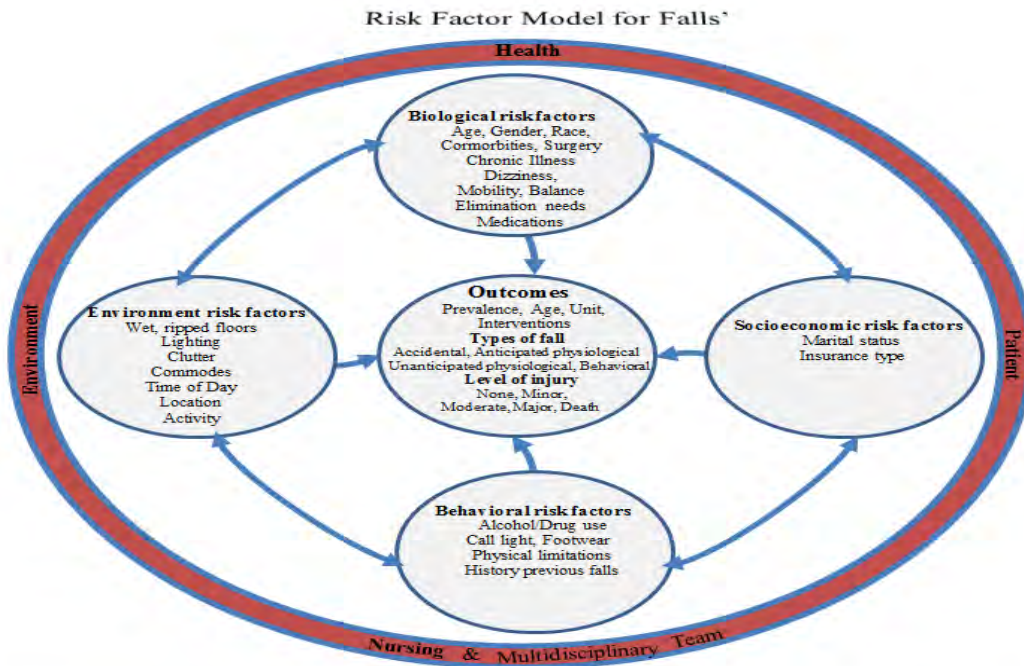


Figure 1 _adapted from the World Health Organization (WHO) www.who.int/ageing/publications/Falls_prevention7March.pdf - 391k

Conceptual and Operational Definitions

For the purpose of this study, The National Database of Nursing Quality Indicators® (NDNQI®) (2013) definition of a fall will be utilized as an unexpected sudden descent to the floor or extension of the floor with or without injury, including assisted falls. The fall may be accidental (e.g., trip or slip on the floor or fall out of bed when reaching for something on the bedside table) or anticipated (e.g., needs assisted devices such as walker or cane, diuretic or sleeping pills). Unanticipated physiological (e.g., seizure, stroke) or behavioral falls (e.g., purposefully throws oneself on the floor) are not captured in this study.

Biological risk factors are the intrinsic and extrinsic factors that pertain to the person. Characteristics of age, gender, and race are non-modifiable (World Health, 2008) and their impact may be based on culture and where they are in relation to the life cycle (Neugarten, 1979) of the middle-age (45-64) adult (Levinson, 1986). Examples of biological risk factors include comorbidities, chronic illness (i.e. chronic renal failure, COPD, CHF), mobility status, balance, and elimination needs. Patients taking medications that include narcotics and sedatives may also experience altered cognitive ability. Diuretics that increase urine flow create an urgency to rush to a bathroom without proper nursing assistance.

Socioeconomic risk factors encompass marital status and availability of insurance directly influences the patient's acceptance of their limitations including their ability to seek health care and openness to accept assistance when in a dependent role versus a daily independent role.

Behavioral risk factors include those factors requiring actions by the patient, nursing and the multidisciplinary team to reduce fall risk or fall occurrences. For example, a patient's nutrition and exercise habits prior to a hospitalization are modifiable risks for a patient's fall (WHO, 2007). Patients admitted for alcohol and addiction experience altered decision making affecting their cognitive abilities to adapt to their physical environment. Other risk factors include patients at-risk for a fall not seeking assistance by use of a call bell (Johnson et al., 2011) or lack of proper non-skid footwear when ambulating. Often patients lack adequate understanding that they may experience weaknesses, postural hypotension or syncopal episodes due to hospitalization when they attempt to get out of bed (Oliver et al., 2010).

Environmental risk factors are those extrinsic factors that create hazards due to wet, ripped or uneven floors, poor lighting, clutter in the way, use of commodes, the time of day, an unfamiliar environment, getting out of bed, out of a chair or going into a small bathroom. Often

patients have intravenous tubing and urinary catheter tubes with bags that make it a challenge when trying to get out of bed or to walk

Outcomes are based on the interaction of biological factors with socioeconomic, behavioral, and environmental risk. The factors in each of these dimensions increase the risk of a patient fall and the potential for injury. Based on the aims of this study identifying the middle-age adult characteristics that increase risk within each dimension include prevalence, age, where falls occur, interventions, pattern of repeat falls, types of falls and level of injury. In addition, outcomes important to evaluate include determining if staffing levels affect unit fall rates. Analysis of this data includes the risk factors that make the middle-age vulnerable for falls and also those high-risk situations that increase the possibility for injury to inform further interventions for the middle-aged patient.

This WHO (2007) model was used in the Study on Global Aging and Adult Health (SAGE) that measured prevalence and risk factors in six low and middle income countries including a sample of N=34,138 adults, 50 years of age and older (Hestekin et al., 2013). The study reported statistically significant findings that depression ($p<0.01$), arthritis ($p<0.1$), grip strength ($p<0.05$), insufficient intake of fruits and vegetables ($p<0.05$), severe or extreme sleep problems ($p<0.05$), water sources outside the home ($p<0.05$) and completed secondary education ($p<0.05$) were associated with an increased fall-related injury in community low to middle-income adults. To date, no study has utilized this model to study middle-age persons and falls in the hospital setting.

The adapted WHO *Risk Factor Model for Falls in the Older Age* (WHO, 2007) is an appropriate model to guide the study aims regarding risk factors for middle-age inpatients. These risk factors have been found by the WHO organization to affect the health well-being of adults in

the community based on fall literature review are easily adaptable to the middle-age inpatient (see figure 1). This model will be used to collect and analyze data to understand the risk factors associated with the middle-age adult.

Methods

Design

This study will use a mixed method design. Aims 1-3 will use a retrospective quantitative, descriptive method to describe the risk factors of the middle-age population for falls and associated injuries. For aim 4, a qualitative descriptive method will be used to explore the phenomenon of the patient's experience of their risk for falling.

For study aims 1-3, secondary data will be analyzed to describe the falls prevalence, risk factors and use of interventions for the middle-age adult from hospital occurrence data, chart review and electronic medical records (including data on falls per patient per 1000 days, patient days of hospitalization and Registered Nurse (RN) staffing (see Table 4).

Aim 4 will take place after aim 1 data analysis is completed to inform probes for the qualitative interviews. In-patients hospitalized who fell during this admission will be interviewed. An interview guide will use open-ended questions to be asked of each participant in Aim 4 (See Appendix A). Planned and unplanned probes will be used based on current literature and Aim 1 findings. The interview will include asking the participant to complete a demographic data sheet (Appendix B.) for analyses of findings. This information obtained will include demographics and potential fall risk factors such as the type of medications taken, health issues such as diabetes, heart disease, renal failure, and time of day of fall.

Table 4

Specific Aim 1

Describe fall risk factors that are specific to middle-age patient through use of secondary data sets;

Method:	Data Variables	Analysis
Secondary Data Analysis	<p>Types falls</p> <ul style="list-style-type: none"> • Accident • Anticipated physiologic • Unanticipated physiologic <p>Risk factors</p> <p>Biological</p> <ul style="list-style-type: none"> • Age • Gender • Race • Preferred Language • Cormorbities • Medication (e.g. sedative, cardiac, anticoagulant, narcotic, diuretic, laxative) • Surgery • Elimination needs <p>Socioeconomic</p> <ul style="list-style-type: none"> • Marital Status (single, married, widowed, divorced) • Insurance type (Commercial, Commonwealth Care, Medicaid, Medicare, disability, none) <p>Behavioral</p> <ul style="list-style-type: none"> • Alcohol/Drugs • Call light used • Footwear use • History of fall within 3 months • Use of assisted devise • Needs assistance OOB <p>Environmental</p> <ul style="list-style-type: none"> • Wet, ripped floors • lighting • clutter • IV poles • Commodes • Time of Day • Unit • Fall on day of admission • Fall on day of discharge • Transfer from one Unit to another <p>Level of injury</p> <ul style="list-style-type: none"> • None • Minor • Moderate • Major • Death <p>Type of injury</p> <ul style="list-style-type: none"> • Bruises /skin tears • Lacerations • Fractures/subdural hematomas • Death <p>Risk and Injury Assessment</p> <ul style="list-style-type: none"> • Morse Score- low, medium ,high • ABC's (bone, coagulation, surgery) 	Descriptive Statistics, non-linear associations, chi-square statistics, two-sample t-test
Specific Aim 2 Explore the relationship between unit specific data, fall numbers, type of falls, injuries from falls, staffing ratios and prevention strategies used		
Method	Data Variables	Analysis
Secondary Data Analysis	Unit specific data Fall rates Type of falls Injuries falls Injuries from falls per 1000 days, patient days of hospitalization Staffing ratios Interventions Used	Descriptive Statistics Pearson product-moment coefficient, Spearman rank correlation , cross-tabs, chi-square, t-test/ANOVA, logistic regression
Specific Aim 3 Determine the prevalence of fall and injury rates in the middle-age patient compared to the overall hospital adult population ages 21-44 and 65-90;		

Method	Data Variables	Analysis
Secondary Data Analysis	Prevalence of falls ages 21-44 and 65-90 Injuries of patients who fell ages 21-44 and 65-90 Determine prevalence fall and injury rates of middle-aged 45-64 in	Descriptive Statistics, Quartiles
Specific Aim 4 Describe the middle-age patient's perception of fall risks including accidental and anticipated risks and prevention strategies		
Method	Data Variables	Analysis
Qualitative Descriptive	Interview guide and probes (See Appendix A) Demographic Data Sheet (See Appendix B)	Probes of above risk factors Coding/ categories/themes Descriptive Statistics-Measures of central tendency

Sample and Setting

Secondary data collection and qualitative interviews will be conducted at a large academic teaching hospital located in Central Massachusetts. This academic teaching hospital sees 134, 891 patients in the Emergency Department and has 38,403 hospital admissions. It is licensed for 712 beds, has 9,376 employees, and includes 2216 registered nurses (UMassMemorial, 2014) with an average daily census of 491 patients. For this study, secondary data collected and interviews will involve patients who fell on medical (n=10), surgical (n=6), mixed medical units (n=4), critical care (n=8), and other specific type units such as post-anesthesia care and procedural areas (n=9).

On January 1, 2012, the academic teaching hospital implemented an electronic medical record (EMR) which contains secondary data to be accessed upon IRB approval for the study. During a 2.5 year time period from January 2012- January 2014, approximately 439 falls occurred in the hospital. Of these falls, 374 “unique” patients experienced one fall while 65 patients had more than one fall. For the purposes of meeting study aims 1 and 2, secondary data analysis (including chart review data) will be performed on an estimate sample number of 439 falls based on this number of falls during the 2.5 year time period. This sample number may increase once the final sample is identified. Study aim 3 will use descriptive statistics to compare

the middle-age population's (45-64) prevalence fall data and injury rates with inpatients 21-44 and 65-90 years old during the study period.

Eligibility criteria for Aims 1 and 2 includes EMR availability of secondary data including chart information from January 2012-July 2014 of adult patients age 45-64 years old (middle-age range) that had an inpatient fall. Study aim 3 will include secondary data from the EMR of all inpatients that meet the study criteria comparing middle-age prevalence of a fall and injuries related to the fall with inpatients 21-44 and 65-90 years of age.

For the purpose of study aim 4, a purposeful sample of 10-12 in-patients who fell during their current admission, will be enrolled to participate in the qualitative interview describing their experience. This sample number was determined based on qualitative descriptive purposes of this study aim as described by Sandelowski (Sandelowski, 2000) and Waltz, Strickland and Lenz (2010). Study aim 4 inclusion criteria will be patients age 45-64 year old (middle-age) who had a fall during their current admission, cognitively coherent based on nursing documentation as awake, alert, and oriented. In addition, they will require the ability to read and understand English to be able to provide information for a demographic data sheet and qualitative descriptive interview.

Exclusion criteria for study aims 1-4 include: (a) an adult patient fall on a psychiatric unit; (b) an adult patient fall during an outpatient appointment in the ambulatory department; (c) a fall by visitors, students, and staff members; and, (d) for aims 1-2 adult patients with cognitive disabilities (dementia or developmentally challenged). In addition for aim 4, middle-age adults will be excluded from this study if they are sedated, confused, cannot read or understand English, or have a severe psychiatric disorder.

Data Collection and Procedure

The Principal Investigator (PI) will obtain IRB approval from the UMass Medical School Human Subjects Committee to conduct this study. IRB approval request will be made for study of aims 1-4. The study will require ability to obtain retrospective secondary data based on the Fall Risk Model, from several sources. This will include data from the hospital's secure Occurrence Report Access data base and the hospital's EMR from January 2012- July 2014. The PI has permission to request data from the Risk Management Department for Occurrence data for aim 1-3 including unit specific data, prevalence and injury data and from the hospital analytics' department for staffing ratios.

In her current job, the PI has access to the EMR, using a secure password. The data for this study will only be accessed with permission of IRB. Data with patient identifiers from the occurrence data base will be exported into an Excel spreadsheet (see Appendix C). This will be to allow for identification of patients who have more than one fall in the study period. Data variables not available from the occurrence will then be abstracted from the EMR and added to the Excel sheet. All patients in the study will be provided a code to de-identify the patient population. Only de-identified data will then be transferred into SPSS a data analysis tool. This file will be password protected, and stored on encrypted computer files on a secure network.

For study aims 1-3, the procedure for extraction of secondary data will include biological, socioeconomic, environmental and behavioral risk factors from fall's occurrence report data from January 2012- July 2014. Occurrence data on falls is submitted by clinical staff who report on a patient fall using an occurrence form that is entered into a secured risk-management data base, using an electronic computerized software system. The PI, who is familiar with this form and process, will identify discrete data elements to collect (see Table 4) regarding the fall

variables such as age, gender, length of stay, and Morse score identifying fall risk as low (0-35), medium (36-54) or high (55-125). Important study variables identified in the *Risk Factor for Falls Model* that is not captured in the occurrence database will be collected through additional EMR chart review (see Table 4).

The procedure for aim 4 involves conducting an exploratory descriptive qualitative interview with middle-age adult patients about their perspectives for fall injury risks and interventions. An interview guide (Appendix A) for interviews and field notes recording observation will be used. The interview will be semi-structured as the PI will continually analyze the language and categories provided by the participant and may use additional probes to ensure fully capture of the patient's perspective.

Interviews will be audio taped using two recorders in case of a malfunction and take approximately 30 minutes. One recorder will be used to transcribe interviews verbatim by a professional transcriptionist. Patients will be identified by a code number with no patient identifiers used on audiotapes. Only the PI will know patient identification by code number. The PI will proof read each transcript to verify accuracy of transcription. Verification of trustworthiness of data as described by Lincoln & Guba (1985) to maintain scientific rigor and assuring reliability and validity of data will occur. The PI will use audit trails, constant comparative methods with the PI's dissertation chair, and include member checks for validation of data collected. Participants will be asked permission to contact them for follow-up including a telephone number that they can be reached for member checks. The PI may contact them within 30 days to verify accuracy of analysis. Refusal to have a follow-up telephone call will not affect their participation in the study.

The PI has obtained leadership approval for conducting the study with permission to utilize a pool of clinical staff for recruitment of patients who fell. They will be asked to request the patient's permission for the PI to approach them about participating in the study. The clinical peers that are available for recruitment include unit managers, clinical coordinators, clinical educators and quality project managers. At staff meetings, the PI will provide an explanation of the purpose and aims of the study, and seek peers assistance in the recruitment of potential participants. The PI will review with them eligibility criteria and provide a study fact sheet (Appendix C) to hand out to eligible patient participants. The PI in her current work responsibilities receives daily notification of any patient fall and will reach out to designated clinical staff. The PI will ask permission from IRB for a waiver of written consent as the study aims have minimal risk for subjects participating. An honorarium of a \$5.00 gift card will be given to the participant in appreciation of the time given to participate in an interview for study of aim 4.

Data Management

Risk Management will run a query off the Risk Management database using criteria from the study. Based on available information entered by clinical staff, data will be down loaded into an Excel spread sheet (Appendix D). Elements not available will be obtained through manual data abstraction from the EMR by the PI. It is known that not all data elements will be available through the occurrence report system. This will require the PI to perform 100% of chart review to collect and manually enter onto the EXCEL sheet for aim 1. For aim 2, the hospital's analytic staff will pull data from the EMR and provide data in an Excel format. All data will then be exported into the IBM® SPSS v21 data software for analysis.

The PI will be responsible for data collection and data management using secured password protected network files. For protection, the data on the secured network is backed up nightly. Data will be transferred from the excel sheet into an IBM[®] SPSS v21 data table as de-identified data for study analysis purposes. Additional data that will be collected and de-identified will include number of patient days, staffing ratios on individual units for dates when falls occurred, and weekly fall rates collected from the EMR system.

In IBM[®] SPSS v.22, study data variables defined for this study (see Table 4) will be entered into a single data table with a unique identification number that will correspond with each fall occurrence allowing for one to multiple falls by a single patient. Each row will correspond to the fall and each column to a fall variable. The IBM[®] SPSS v.22 column names in the data table will correspond to the master excel spread sheet. A separate excel sheet that only the PI will have access to will contain the fall participant ID that corresponds to the participant medical record number (MRN) and date of birth for the initial merging of data and identification for repeat falls including study variables. The EXCEL sheet with patient MRNs will be kept on the secure password protected file until the study is completed. This data will then be deleted in accordance with IRB requirements once the study is completed.

The PI will be responsible for entering data into the EXCEL sheet including double entry verification then exporting this data into the IBM SPSSv22 software. A statistician will be consulted as part of the dissertation study team to assure validity of data analysis results. The PI will meet regularly with the statistician and dissertation study chair to review data for accuracy and completeness. Microsoft Excel (2010) spreadsheets and IBM SPSS v.21 data software will be used for data collection, codebook development and data cleaning.

For aims 1-4, data including audio recordings will be de-identified and stored on a password protected R drive that only the PI, study statistician, and dissertation chair have access. Once the PI and chair have validated transcripts, the information on the audiotapes will be destroyed. Audiotapes will be kept in a locked drawer in the PI's secured office during the study period.

Data Analysis

Specific aim 1 is a descriptive study describing the sample's fall risk factors that are specific to the middle-aged (ages 45-64) hospitalized adults. Descriptive statistics to be analyzed will include mean, standard deviation, median, and range. Continuous variables will also be categorized as needed to accommodate non-linear associations (e.g. age, length of stay, Morse score). Aim 1 includes variables related to fall prevalence, patient and unit characteristics, risk factors, injuries and types of falls data (see Table 4). With a sample of 439 falls, we can estimate a percentage, e.g., percentage of falls coming from female patients, to within $\pm 4.7\%$ with 95% confidence, i.e., the half-width of the 95% confidence interval is 4.7%, assuming the true underlying percentage is 50%. For percentages closer to 0 or 100, this half-width will be even smaller. Further analysis will also use chi-square statistics for categorical data variables and two-sample t-test for continuous data variables.

Aim 2 data analysis will consist of exploring relationships that exist between unit specific data and fall numbers, type of falls, injuries, staffing ratios and interventions used. Pearson product-moment coefficient will be used for continuous data. Spearman rank correlation will be used to describe relationships between ordinal variables analyzed to identify correlates of falls. This will involve crosstabs and chi-square statistics for categorical predictors and t-tests/ANOVA for continuous predictors. Sample t-test will be used for between-group mean

differences for comparing variables such as # of falls, and if interventions were used (yes/no). Multivariate analyses would involve logistic regression (e.g. outcome of falls injury with day of admission) to describe relationships between ordinal and categorical characteristics. Descriptive statistics will be used to describe fall prevention interventions, nursing staffing ratios and level of injury. Aim 3 to determine prevalence data will include analyses using descriptive statistics to describe fall prevalence, injury rates and quartiles for frequency distribution.

For aim 4, descriptive statistics will be used for demographic data and risk factors. Qualitative content analysis (Miles, Huberman, & Saldaña, 2013) will be used to analyze the interview data. Transcripts will be read and summarized as the study progresses. Coding will occur using the participant's own words. Data will be reviewed one section at a time to achieve data reduction. Transcripts will be examined for similarities and analysis will occur across cases. Hand coding will then be utilized for analysis. Data will be placed in codes, codes compared, categories, and themes then developed. The PI's study team includes experts in qualitative coding to collaborate with in analysis of categories and theme development.

Protection of Human Subjects

This study will be submitted for review to the Institutional Review Board (IRB) at the University of Massachusetts Medical School (UMMS). The PI will obtain permission from IRB to access retrospective secondary data to collect de-identified patient data on fall risk, prevalence and related falls data as described in Table 2. The PI will also ask for permission to screen for patients who had a fall using the Fall Occurrence Data base. The nurse manager or clinical staff person in the quality safety department will approach the patient to ask their permission for the PI to meet with them, about aim 4's study purpose. For aim 4, participants will be told by the PI about the purpose of the study, that responses will be kept confidential, their voluntary rights

including withdrawal from the study at any time, and that refusal to participate in no way affects the patient's care. Participants will be given a HIPAA, IRB approved waiver of consent that explains the study purpose, procedure, confidentiality, minimal risk, and PI/Dissertation study chair, contact information. This research study does have minimal risks while a slight risk for the participant includes experiencing emotional stress from recalling the fall event. In the event a patient experiences severe distress from recalling this event, the Unit Manager or supervisor will be notified immediately by the PI to provide necessary health care team support and follow-up care. An addendum will also be submitted to IRB for any significant changes made to the Interview Guide after analysis of aim 1 findings.

Limitations

Results of this study are limited to one academic hospital and may not be generalizable to all similar hospitals or adult inpatient populations. Missing data elements may be a problem. The PI will attempt to extract all missing data elements identified on the excel spread sheet while data in the clinical chart is dependent on staff documentation. This may result in null findings if such data is not available. For aim 4, maintaining trustworthiness through reflexivity, reliability and objectivity is challenging in qualitative descriptive studies.

Summary

This descriptive study of inpatient falls and injury in the middle-age population will provide new nursing knowledge to aid in the development of evidence-based fall and injury prevention. The secondary data analysis will provide information to identify specific fall risk factors. Information from the interview findings of middle-age participants will provide patients insight that informs nurses and the multidisciplinary team about strategies to prevent falls in this population.

References

- AHRQ. (2012). Never Events. *Patient Safety Primers* Retrieved June 1, 2014, from <http://psnet.ahrq.gov/primerHome.aspx>
- AHRQ. (2013). Preventing Falls in Hospitals: A Toolkit for Improving Quality of Care Retrieved January 2013, from <http://www.ahrq.gov/professionals/systems/hospital/fallpxtoolkit/index.html>
- Boltz, M. (2009). Critical steps to prevent falls in hospitalized older patients. *Nursing Management, 40*(7), 14-17. doi: 10.1097/01.NUMA.0000357796.15645.c7
- Bouldin, E. L., Andresen, E. M., Dunton, N. E., Simon, M., Waters, T. M., Liu, M., . . . Shorr, R. I. (2013). Falls among adult patients hospitalized in the United States: prevalence and trends. *Journal of Patient Safety, 9*(1), 13-17. doi: 10.1097/PTS.0b013e3182699b64
- Bradley, S. M., Karani, R., McGinn, T., & Wisnivesky, J. (2010). Predictors of serious injury among hospitalized patients evaluated for falls. *Journal of Hospital Medicine, 5*(2), 63-68. doi: 10.1002/jhm.555
- Butcher, L. (2013). The no-fall zone. *Hospitals and Health Networks, 87*(6), 26-30, 21. Retrieve from: <http://www.ncbi.nlm.nih.gov/pubmed/23885481>
- Calasanti, T., Pietila, I., Ojala, H., & King, N. (2013). Men, bodily control, and health behaviors: the importance of age. *Health Psychology, 32*(1), 15-23. doi: 10.1037/a0029300
- Cameron, I. D., Murray, G. R., Gillespie, L. D., Robertson, M. C., Hill, K. D., Cumming, R. G., & Kerse, N. (2010). Interventions for preventing falls in older people in nursing care facilities and hospitals. *Cochrane Database Syst Rev*(1), CD005465. doi: 10.1002/14651858.CD005465.pub2

- Carroll, D. L., Dykes, P. C., & Hurley, A. C. (2010). Patients' perspectives of falling while in an acute care hospital and suggestions for prevention. *Applied Nursing Research, 23*(4), 238-241. doi: 10.1016/j.apnr.2008.10.003
- Clancy, C. M. (2013). Evidence-based toolkit helps organizations reduce patient falls. *Journal of Nursing Care Quality, 28*(3), 195-197. doi: 10.1097/NCQ.0b013e318294a9d1
- Clothier, J. (2004). Middle age and adulthood Retrieved March 9, 2014, from <http://www.uams.edu/m2004>
- Clyburn, T. A., & Heydemann, J. A. (2011). Fall prevention in the elderly: analysis and comprehensive review of methods used in the hospital and in the home. *Journal of the American Academy of Orthopaedic Surgeons, 19*(7), 402-409. Retrieve from: <http://www.jaaos.org>
- CMS. (2012, 2012). Hospital aquired conditons Retrieved December 31, 2013, from http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/Hospital-Acquired_Conditions.html
- Cozart, H. C., & Cesario, S. K. (2009). Falls aren't us: state of the science. *Critical Care Nursing Quarterly, 32*(2), 116-127. doi: 10.1097/CNQ.0b013e3181a27dc0
- Currie, L. M. (2006). Fall and injury prevention. *Annual Review of Nursing Research, 24*, 39-74. Retrieve from: <http://www.ncbi.nlm.nih.gov/pubmed/17078410>
- Currie, L. M. (2008). Fall and Injury Prevention. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses* (pp. 1-195 -191-250). Rockville (MD): AHRQ Publication No. 08-0043.

- DiBardino, D., Cohen, E. R., & Didwania, A. (2012). Meta-analysis: multidisciplinary fall prevention strategies in the acute care inpatient population. *Journal of Hospital Medicine*, 7(6), 497-503. doi: 10.1002/jhm.1917
- Dykes, P. C. (2012). Adding targeted multiple interventions to standard fall prevention interventions reduces falls in an acute care setting. *Evidence-Based Nursing*, 15(4), 109-110. doi: 10.1136/ebnurs-2012-100630
- Dykes, P. C., Carroll, D. L., Hurley, A., Lipsitz, S., Benoit, A., Chang, F., . . . Middleton, B. (2010). Fall prevention in acute care hospitals: a randomized trial. *JAMA*, 304(17), 1912-1918. doi: 10.1001/jama.2010.1567
- Fischer, I. D., Krauss, M. J., Dunagan, W. C., Birge, S., Hitcho, E., Johnson, S., . . . Fraser, V. J. (2005). Patterns and predictors of inpatient falls and fall-related injuries in a large academic hospital. *Infection Control and Hospital Epidemiology*, 26(10), 822-827. doi: 10.1086/502500
- Forte, J. (2011). Impact of falls on facilities. *Best Practices for Fall Reduction: A Practicle Guide* Retrieved November 24, 2013, 6, from <http://www.americannursetoday.com>
- Haines, T. P., Hill, A. M., Hill, K. D., McPhail, S., Oliver, D., Brauer, S., . . . Beer, C. (2011). Patient education to prevent falls among older hospital inpatients: a randomized controlled trial. *Archives of Internal Medicine*, 171(6), 516-524. doi: 10.1001/archinternmed.2010.444
- Hall, M. J., Levant, S., & DeFrances, C. J. (2012). Increasing Congestive Heart Failure Hospitalization from 2000 to 2010 for those under 65: A Cause for Concern? *NCHS Data Brief* (Vol.). Hyattsville, MD: National Center for Health Statistics.

- Hallstrom, I., & Elander, G. (2001). Needs during hospitalization: definitions and descriptions made by patients. *Nursing Ethics*, 8(5), 409-418. Retrieve from:
<http://www.ncbi.nlm.nih.gov/pubmed/16004095>
- Halm, M. A., & Quigley, P. A. (2011). Reducing falls and fall-related injuries in acutely and critically ill patients. *American Journal of Critical Care*, 20(6), 480-484. doi: 10.4037/ajcc2011606
- Harrington, L., Luquire, R., Vish, N., Winter, M., Wilder, C., Houser, B., . . . Qin, H. (2010). Meta-analysis of fall-risk tools in hospitalized adults. *Journal of Nursing Administration*, 40(11), 483-488. doi: 10.1097/NNA.0b013e3181f88fbd
- Healey, F. (2011). Implementing a Fall Prevention Program Retrieved August 21, 2013, from <http://webmm.ahrq.gov/perspective.aspx?perspectiveID=114>
- Hempel, S., Newberry, S., Wang, Z., Booth, M., Shanman, R., Johnsen, B., . . . Ganz, D. A. (2013). Hospital fall prevention: a systematic review of implementation, components, adherence, and effectiveness. *Journal of the American Geriatrics Society*, 61(4), 483-494. doi: 10.1111/jgs.12169
- Hendrich, A. L., Bender, P. S., & Nyhuis, A. (2003). Validation of the Hendrich II Fall Risk Model: a large concurrent case/control study of hospitalized patients. *Applied Nursing Research*, 16(1), 9-21. doi: 10.1053/apnr.2003.YAPNR2
- Hestekin, H., O'Driscoll, T., Stewart, W. J., Kowal, P., Peltzer, K., & Chatterji, S. (2013). Measuring prevalence and risk factors for fall-related injury in older adults in low-and middle-income countries: results from the WHO Study on Global AGEing and Adult Health (SAGE) (Vol. Sage Working Paper No 6, pp. pdf, 618kb). Australia: World Health Organization.

- Hignett, S., & Masud, T. (2006). A review of environmental hazards associated with in-patient falls. *Ergonomics*, *49*(5-6), 605-616. doi: 10.1080/00140130600568949
- Hitcho, E. B., Krauss, M. J., Birge, S., Claiborne Dunagan, W., Fischer, I., Johnson, S., . . . Fraser, V. J. (2004). Characteristics and circumstances of falls in a hospital setting: a prospective analysis. *Journal of General Internal Medicine*, *19*(7), 732-739. doi: 10.1111/j.1525-1497.2004.30387.x
- Hu, H. M., Tzeng, H.-M., & Yin, C.-Y. (2011, 2011 November-December). The Relationship of the Hospital-Acquired Injurious Fall Rates with the Quality Profile of a Hospital's Care Delivery and Nursing Staff Patterns. *Nursing Economics*, *29*, 299+.
- IOM. (1999). To Err Is Human: Building a Safer Health System. *Institute of Medicine*. Retrieve from: http://www.nap.edu/openbook.php?record_id=9728
- Johnson, M., George, A., & Tran, D. T. (2011). Analysis of falls incidents: Nurse and patient preventive behaviours. *International Journal of Nursing Practice*, *17*(1), 60-66. doi: 10.1111/j.1440-172X.2010.01907.x
- Kalisch, B. J., Tschannen, D., & Lee, K. H. (2012). Missed nursing care, staffing, and patient falls. *Journal of Nursing Care Quality*, *27*(1), 6-12. doi: 10.1097/NCQ.0b013e318225aa23
- Krauss, M. J., Nguyen, S. L., Dunagan, W. C., Birge, S., Costantinou, E., Johnson, S., . . . Fraser, V. J. (2007). Circumstances of patient falls and injuries in 9 hospitals in a midwestern healthcare system. *Infection Control and Hospital Epidemiology*, *28*(5), 544-550. doi: 10.1086/513725
- Levinson, D. J. (1986). A conception of adult development. *American Psychologist*, *41*(1), 3. Retrieve from: <http://graphics.tx.ovid.com.ezproxy.umassmed.edu/ovftpdf>.

- Lincoln, Y. S., & Guba, E. G. (1985). Establishing trustworthiness. *Naturalistic inquiry*, 289-331.
- Lindberg, C., Fagerström, C., Sivberg, B., & Willman, A. (2014). Concept analysis: patient autonomy in a caring context. *Journal of Advanced Nursing*, n/a-n/a. doi: 10.1111/jan.12412
- Lohse, G. R., Leopold, S. S., Theiler, S., Sayre, C., Cizik, A., & Lee, M. J. (2012). Systems-based safety intervention: reducing falls with injury and total falls on an orthopaedic ward. *Journal of Bone and Joint Surgery*, 94(13), 1217-1222. doi: 10.2106/JBJS.J.01647
- Lopez, K. D., Gerling, G. J., Cary, M. P., & Kanak, M. F. (2010). Cognitive work analysis to evaluate the problem of patient falls in an inpatient setting. *Journal of the American Medical Informatics Association*, 17(3), 313-321. doi: 10.1136/jamia.2009.000422
- Miake-Lye, I. M., Hempel, S., Ganz, D. A., & Shekelle, P. G. (2013). Inpatient fall prevention programs as a patient safety strategy: a systematic review. *Annals of Internal Medicine*, 158(5 Pt 2), 390-396. doi: 10.7326/0003-4819-158-5-201303051-00005
- Middleage. (n.d.). In *Merriam-Webster's online dictionary* (copyright ©2014) Retrieved 16 Feb. 2014, from <http://www.merriam-webster.com/dictionary/middle> age
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2013). *Qualitative data analysis: A methods sourcebook* (3 ed.): SAGE Publications, Inc.
- Miller, D. A. (1981). The 'sandwich' generation: adult children of the aging. *Social Work*, 26(5), 419-423. doi: 10.1093/sw/26.5.419
- Mion, L. C., Chandler, A. M., Waters, T. M., Dietrich, M. S., Kessler, L. A., Miller, S. T., & Shorr, R. I. (2012). Is it possible to identify risks for injurious falls in hospitalized

patients? *Joint Commission Journal on Quality and Patient Safety*, 38(9), 408-413.

Retrieve from: <http://www.ncbi.nlm.nih.gov/pubmed/23002493>

Morse, J. M. (2002). Enhancing the safety of hospitalization by reducing patient falls. *American Journal of Infection Control*, 30(6), 376-380. doi: 10.1067/mic.2002.125808

Morse, J. M. (2006). The modified Morse Fall Scale. *International Journal of Nursing Practice*, 12(3), 174-175. doi: 10.1111/j.1440-172X.2006.00573.x

Naqvi, F., Lee, S., & Fields, S. D. (2009). Appraising a guideline for preventing acute care falls. *Geriatrics*, 64(3), 10-13.

NDNQI. (2013). Guidelines for Data Collection and Submission on Patient Falls. *American Nurses Association*, from <http://www.nursingquality.org/>

Neily, J., Howard, K., Quigley, P., & Mills, P. D. (2005). One-year follow-up after a collaborative breakthrough series on reducing falls and fall-related injuries. *Joint Commission Journal on Quality and Patient Safety*, 31(5), 275-285. Retrieve from: <http://www.ncbi.nlm.nih.gov/pubmed/15960018>

Neugarten, B. L. (1979). Time, age, and the life cycle. *American Journal of Psychiatry*, 136(7), 887-894. doi: doi:0002-953X/79/0810887/08

Oliver, D., Britton, M., Seed, P., Martin, F. C., & Hopper, A. H. (1997). Development and evaluation of evidence based risk assessment tool (STRATIFY) to predict which elderly inpatients will fall: case-control and cohort studies. *BMJ*, 315(7115), 1049-1053. Retrieve from: <http://www.ncbi.nlm.nih.gov/pubmed/9366729>

Oliver, D., Connelly, J. B., Victor, C. R., Shaw, F. E., Whitehead, A., Genc, Y., . . . Gosney, M. A. (2007). Strategies to prevent falls and fractures in hospitals and care homes and effect

- of cognitive impairment: systematic review and meta-analyses. *BMJ*, 334(7584), 82. doi: 10.1136/bmj.39049.706493.55
- Oliver, D., Healey, F., & Haines, T. P. (2010). Preventing falls and fall-related injuries in hospitals. *Clinics in Geriatric Medicine*, 26(4), 645-692. doi: 10.1016/j.cger.2010.06.005
- Quigley, P. A. (2013, November 19). *Prevention vs Protection: Applied to Inpatient Falls*. Paper presented at the Best Practices in Fall Prevention, Burlington, MA.
- Quigley, P. A., & Goff, L. (2011). Technological innovations play a leading role in falls-prevention programs. *American Nurse Today*, 6(2), 14-17. Retrieve from: <http://www.americannursetoday.com/>
- Quigley, P. A., Hahm, B., Collazo, S., Gibson, W., Janzen, S., Powell-Cope, G., . . . White, S. V. (2009). Reducing serious injury from falls in two veterans' hospital medical-surgical units. *Journal of Nursing Care Quality*, 24(1), 33-41. doi: 10.1097/NCQ.0b013e31818f528e
- Quigley, P. A., Neily, J., Watson, M., Wright, M., & Strobe, K. (2007). Measuring fall program outcomes. *Online Journal of Issues in Nursing*, 12(2), 8. doi: 10.3912/OJIN.Vol12No02PPT01
- Quigley, P. A., & White, S. V. (2013). Hospital-based fall program measurement and improvement in high reliability organizations. *Online Journal of Issues in Nursing*, 18(2), 5. doi: 10.3912/OJIN.Vol18No02Man05
- Rush, K. L., Robey-Williams, C., Patton, L. M., Chamberlain, D., Bendyk, H., & Sparks, T. (2009). Patient falls: acute care nurses' experiences. *Journal of Clinical Nursing*, 18(3), 357-365. doi: 10.1111/j.1365-2702.2007.02260.x

- Sand-Jecklin, K., & Sherman, J. (2013). Incorporating bedside report into nursing handoff: evaluation of change in practice. *Journal of Nursing Care Quality, 28*(2), 186-194. doi: 10.1097/NCQ.0b013e31827a4795
- Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing and Health, 23*(4), 334-340. doi: 10.1002/1098-240x(200008)23:4<334::aid-nur9>3.0.co;2-g
- Shorr, R. I., Chandler, A. M., Mion, L. C., Waters, T. M., Liu, M., Daniels, M. J., . . . Miller, S. T. (2012). Effects of an intervention to increase bed alarm use to prevent falls in hospitalized patients: a cluster randomized trial. *Annals of Internal Medicine, 157*(10), 692-699. doi: 10.7326/0003-4819-157-10-201211200-00005
- Shorr, R. I., Mion, L. C., Chandler, A. M., Rosenblatt, L. C., Lynch, D., & Kessler, L. A. (2008). Improving the capture of fall events in hospitals: combining a service for evaluating inpatient falls with an incident report system. *Journal of the American Geriatrics Society, 56*(4), 701-704. doi: 10.1111/j.1532-5415.2007.01605.x
- Spoelstra, S. L., Given, B. A., & Given, C. W. (2012). Fall prevention in hospitals: an integrative review. *Clinical Nursing Research, 21*(1), 92-112. doi: 10.1177/1054773811418106
- Stalhandske, E., Mills, P., Quigley, P., Neily, J., & Bagian, J. P. (2008). VHA's National Falls Collaborative and Prevention Programs Culture and Redesign). Retrieve from: <http://www.ncbi.nlm.nih.gov>.
- Stevens, J. A., Mack, K. A., Paulozzi, L. J., & Ballesteros, M. F. (2008). Morbidity and Mortality Weekly Report (MMWR). 57(9), 225-229. Retrieved from <http://www.cdc.gov> Retrieve from: <http://www.cdc.gov>

- Talbot, L. A., Musiol, R. J., Witham, E. K., & Metter, E. J. (2005). Falls in young, middle-aged and older community dwelling adults: perceived cause, environmental factors and injury. *BMC Public Health*, 5, 86. doi: 10.1186/1471-2458-5-86
- TheJointCommission. (2005). Strategies for addressing the root causes of falls. *Reducing the Risk of Falls in Your Health Care Organization. Oakbrook Terrace, IL: The Joint Commission*, 29-50.
- TheJointCommission. (2014). Sentinel Event Data Summary. *SE Statistics as of: 3/25/2014*. Retrieved June 1, 2014, from www.jointcommission.org
- Titler, M. G., Shever, L. L., Kanak, M. F., Picone, D. M., & Qin, R. (2011). Factors associated with falls during hospitalization in an older adult population. *Res Theory Nurs Pract*, 25(2), 127-148. doi: 10.1891/1541-6577.25.2.127
- TJC. (2005). MAINTAINING SAFETY • REDUCING RISK. *JOINT COMMISSION PERSPECTIVES ON PATIENT SAFETY*, 5(8), 22. Retrieve from: <https://www.premierinc.com/safety/safety-share/08-05-downloads/11-perspectives-07-05.pdf>
- Tzeng, H. M. (2010). Understanding the prevalence of inpatient falls associated with toileting in adult acute care settings. *Journal of Nursing Care Quality*, 25(1), 22-30. doi: 10.1097/NCQ.0b013e3181afa321
- Tzeng, H. M. (2011a). Nurses' caring attitude: fall prevention program implementation as an example of its importance. *Nurs Forum*, 46(10), 2011 Jul-Sep;2046(2013):2137-2045. doi: <http://dx.doi.org/10.1111/j.1744-6198.2011.00222.x>

- Tzeng, H. M. (2011b). Triangulating the extrinsic risk factors for inpatient falls from the fall incident reports and nurse's and patient's perspectives. *Applied Nursing Research, 24*(3), 161-170. doi: 10.1016/j.apnr.2009.06.005
- Tzeng, H. M., Hu, H. M., & Yin, C. Y. (2011). The relationship of the hospital-acquired injurious fall rates with the quality profile of a hospital's care delivery and nursing staff patterns. *Nursing Economics, 29*(6), 299-306. Retrieve from:
<http://www.nursingeconomics.net>
- Tzeng, H. M., Titler, M. G., Ronis, D. L., & Yin, C. Y. (2012). The contribution of staff call light response time to fall and injurious fall rates: an exploratory study in four US hospitals using archived hospital data. *BMC Health Services Research, 12*, 84. doi: 10.1186/1472-6963-12-84
- Tzeng, H. M., & Yin, C. Y. (2008). The extrinsic risk factors for inpatient falls in hospital patient rooms. *Journal of Nursing Care Quality, 23*(10), 2008 Jul-Sep;2023(2003):2233-2041. doi: 10.1097/01.NCQ.0000324588.91837.84
- Tzeng, H. M., & Yin, C. Y. (2013). Most and least helpful aspects of fall prevention education to prevent injurious falls: a qualitative study on nurses' perspectives. *Journal of Clinical Nursing, n/a-n/a*. doi: 10.1111/jocn.12295
- Tzeng, H. M., Yin, C. Y., & Grunawalt, J. (2008). Effective assessment of use of sitters by nurses in inpatient care settings. *Journal of Advanced Nursing, 64*(2), 176-183. doi: 10.1111/j.1365-2648.2008.04779.x
- U.S. Census Bureau. (2012). *Age and Sex Composition in the United States* Retrieved 16, Feb, 2014, from <http://www.census.gov/population/age/data/2012comp.html>

UMassMemorial. (2014). Statistics Retrieved June 3, 2014, from

<http://www.umassmemorialhealthcare.org/umass-memorial-medical-center/about-us/statistics>

van Harten-Krouwel, D., Schuurmans, M., Emmelot-Vonk, M., & Pel-Littel, R. (2011).

Development and feasibility of falls prevention advice. *Journal of Clinical Nursing*, 20(19-20), 2761-2776. doi: 10.1111/j.1365-2702.2011.03801.x

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2010). *Measurement in Nursing and Health Research* (4th ed.). New York: Springer Publishing Company.

Weinberg, J., Proske, D., Szerszen, A., Lefkovic, K., Cline, C., El-Sayegh, S., . . . Weiserbs, K.

F. (2011). An inpatient fall prevention initiative in a tertiary care hospital. *Joint Commission Journal on Quality and Patient Safety*, 37(7), 317-325. Retrieve from:

<http://www.ingentaconnect.com/>

WHO. (2007). WHO Global Report on Falls Prevention In Older Age. In W. H. Organization (Ed.), *Ageing and Life Course, Family and Community Health*. Geneva: World Health Organization.

Williams, B., Young, S., Williams, D., & Schindel, D. (2011). Effectiveness of a fall awareness and education program in acute care. *Journal for Nurses in Staff Development*, 27(3), 143-147. doi: 10.1097/NND.0b013e318217b407

Williams, T., Szekendi, M., & Thomas, S. (2014). An analysis of patient falls and fall prevention programs across academic medical centers. *Journal of Nursing Care Quality*, 29(1), 19-29. doi: 10.1097/NCQ.0b013e3182a0cd19

World Health, O. (2008). *WHO global report on falls prevention in older age*. Geneva: World Health Organization.

Wu, S., Keeler, E. B., Rubenstein, L. Z., Maglione, M. A., & Shekelle, P. G. (2010). A cost-effectiveness analysis of a proposed national falls prevention program. *Clinics in Geriatric Medicine*, 26(4), 751-766. doi: 10.1016/j.cger.2010.07.005

Zuyev, L., Benoit, A. N., Chang, F. Y., & Dykes, P. C. (2011). Tailored prevention of inpatient falls: development and usability testing of the fall TIPS toolkit. *CIN: Computers, Informatics, Nursing*, 29(2 Suppl), TC21-28. doi: 10.1097/NCN.0b013e31821552d4

Appendix A. **Interview Guide**

Aim 4 Interview	Probes
1. Tell me a little bit about what happened recently when you fell?	What was happening before you fell? What were you thinking about? What happened after you fell? Has anyone talked with you about falling?
2. Can you think about what might have been helpful to you to prevent this fall?	Has staff done anything to try and prevent you from falling?
3. Can you think about ways that we can help other adults like yourself from falling while in the hospital?	What would help get the message to adults your age that everyone can fall in the hospital?

Appendix B. Demographic Data Sheet:

Participant ID #: _____

1. **Age** at last birthday _____
2. **Gender:** Male: _____ Female: _____
3. **Marital Status:**
 - a. Married
 - b. Divorced
 - c. Widowed
 - d. Single
 - e. Other _____
4. **Race (s)**
 - a. White/Caucasian: _____
 - b. Black/African American: _____
 - c. Asian: _____
 - d. Native Hawaiian or Pacific Islander _____
 - e. American Indian/Native American _____
5. **Ethnicity**
 - a. Hispanic/Latino: _____
 - b. Non-Hispanic/Non-Latino: _____

6. **Health Issues:** Please place a check next to any of the following health issues below that you have?

Arthritis _____ Back injury _____ Bone fracture _____ CHF _____ COPD _____

Chronic Renal Failure _____ Diabetes _____ Heart disease _____ High blood pressure _____

Pneumonia _____ Seizures _____ Stroke _____ Surgery/Procedure _____

Other: _____

(See next page)

7. Type of medications:

a. Any sedatives? Yes ____ Name _____

No ____

b. Any heart medicine? Yes ____ Name _____

No ____

c. Any anticoagulation or blood thinner medicines?

Yes ____ Name _____

No ____

d. Any diuretics or water pills?

Yes ____ Name _____

No ____

e. Any laxatives? Yes ____ Name _____

No ____

f. Any pain medication? Yes ____ Name _____

No ____

Other _____

8. What **time of day** did the fall occur? _____

9. Do you use **any assistive devices** for walking?

Yes ____ Device: _____

No ____

Appendix C. Study Fact Sheet: Fall Injury Risk in Middle-Age Patients

Hello, my name is Donna M. Guillaume, Doctoral Nursing student at UMass Graduate School of Nursing in Worcester. Falls in hospitals remains one of the most reportable, serious, and costly type of events that occur in hospitals. Because of your recent fall occurrence during your hospital stay, you are being asked to participate in an interview to describe your fall experience. Describing your experience will help us to provide a better understanding of why patients like yourself fall in the hospital setting.

Purpose of the Research Study

The purpose of this research study is to conduct patient interviews to describe the experience of why patients between the ages of 45-64 fall in the hospital setting.

Your participation in this study is entirely voluntary and refusal to participate will in no way affect your care.

Participation involves:

1. An interview that will take no more than 30 minutes.
 - a. The interview will be audiotaped to transcribe data for study review. Written transcription will only identify a code number with no patient identifiers to be used.
 - b. You will be asked to complete demographic information sheets such as age and marital status that also includes the type of medications, any health issues, and time of day of your fall.
 - c. You will be asked if we may re-contact by phone for the PI to review the findings from the interview for further clarification.
2. All information will remain confidential with no personal identifiers such as name, specific unit or date of admission to be used. Audiotapes will be erased after transcription is reviewed for accuracy.
3. A \$5.00 gift card will be given in appreciation for participating in this study.

If you have any questions or concerns regarding this study feel free to contact:

Donna M. Guillaume RN, PhD student, at 508 763-6475 Donna.Guillaume@umassmed.edu or Jean Boucher, RN, PhD Dissertation Chair, Jean.Boucher@umassmed.edu.

If at any time during or after the study, you would like to discuss the study or your research rights with someone who is not associated with the research study, you may contact the Administrative Coordinator for the Committee, for the Protection of Human Subjects in Research at UMMS. The telephone number is (508) 856-4261.

Appendix D Secondary Data Collection

Element	Description
Code	
CY	
Medical Record #	
Date of Birth	
Campus	University; Memorial
Unit	Medical; Surgical; Med/Surge; ICU; ED; Procedural/Radiology
Category	Fall
Gender	Male; Female
Marital Status	Married; Single; Widow; Divorced; Significant Other
Insurance Type	None; Medicaid; Medicare; Commonwealth; Private; Disability
English Preferred Language	Yes; No
Race	White/Caucasian; Black/African American; Asian; Native Hawaiian or Pacific Islander; American Indian/Native American; Other
Ethnicity	Hispanic/Latino; Non-Hispanic/Non-Latino
Date of Occurrence	
Time of Occurrence	
Shift	Day; Evening; Night
Date of Admission mm/dd/yyyy	
Date of Discharge mm/dd/yyyy	
Length of Stay (LOS)	Total number of days of hospitalization
LOS of fall Day of admission that fall occurred on	Zero to day # of admission

Day of week of fall	Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
Comorbidities	Arthritis; Back Injury; Bone Fracture; CHF; COPD; Chronic Renal Failure; Diabetes; Heart Disease; High blood pressure; Pneumonia; Seizures; Stroke; Other
Chief Complaint	AMS;GI;Respiratory;Fall;Cardia;Neuro;Weakness;infection; unresponsiveness;Musculoskeletal;Pain; Seizure; Drugs/ETOH; Elective ;Kidney/Liver; Trauma; Other
Admitting Diagnosis	Respiratory;Cncer;Drug/ETOH;Sepsis;Cardiac;Ortho;Neuro; Renal;Vascular;Hemolytic;Pancreatitis;Chronic Pain; History of Falling; Liver; GI; Other
Discharge Status	Rehabilitation Facility; Home with Services; Home with no services; Death; Other
Type of Fall	Accident; Anticipated Physiologic; Unanticipated Physiologic Accident;
Level of Injury	None; Minor; Moderate; Major; Death
Type of Injury	Bruises/Skin tears; Lacerations; Fracture; subdural hematoma; Death
Event Sub	Found on floor; From Bed; From Chair; From Commode; From Toilet; From Wheelchair; From Stretcher; From Exam table; From Other Equipment; During transfer (chair-bed, stretcher-bed);While ambulating alone; While ambulating with staff assist; During treatment session (e.g. PT/OT); Tripped over object; Other Dizzy; Weak; Incontinent
Area of Fall	Patient Room; Bathroom; Hallway; Exam Room; Treatment Room; Other; Found on Floor; Commode; From Chair; Urinal
Risk Assessed Prior to Fall	Yes; No
Morse Score	#
Level of Risk	Low; Medium; High
ABCS	Yes; No
Patient Fall History	Fall 3 mo. prior to admission; Fall this Admission; None
Use of Assistive Device	Cane; Crutch; Eyeglasses/contacts; Hearing Aid; Non-skid socks; Prosthetics; Walker; Wheelchair
Fall Intervention in Place Prior	Call bell in reach; Bed in low position; Risk band on; Footwear; Nonskid socks; Room close to staff; Bed alarms; gait belt; Hourly rounding, Bedside Shift Report; Toileting

	Program; Needs assistance to bathroom; Commode; Other
Last Time Toileted	< 15 min; 16 - 60 min; 1 - 2 hrs. ;> 2 hrs.; Incontinent; Catheterized
Procedure in Last 24hrs	Yes; No
Fall within 4 hrs of Transfer From One Level of Care	Yes; No
Condition Applies to Patient	Agitated/Restless; Alcohol/Drug Withdrawal; Alert & Oriented; Bowel/Bladder incont/freq./nocturia; Delirium; Disoriented; Forgetful; Gait- unsteady; Sit/Stand Balance – poor, none; Sedated; Somnolent; Pain Management
Environment Condition	Adequate lighting; Floor wet; Ripped floor; Clutter; IV poles; Other
Patient Assisted/Lowered to the Floor/Bed/Chair	Yes; No
Types or Classes of Medications Taken 4 Hours Prior to Fall	Anticoagulant; Anticonvulsant; Antidepressant; Antihistamine; Antihypertensive; Antiparkinson; Antipsychotic; Chemotherapeutic; Corticosteroids; Diuretic; Insulin; Laxative; Oral Hypoglycemic; Oxytocic; Potassium; Sedative/Hypnotic; Vasodilator; Vasopressor ; None
Injury Changed Patient's Level of Care	Yes; No
Body Part Affected	Finger(s); Foot/Ankle (L); Foot/Ankle (R); Hand/Wrist (L);Hand/Wrist (R); Head; Hip (L); Hip (R); Leg/Knee (L);Leg/Knee (R);Neck; Other

Executive Summary

Despite the plethora of research related to fall prevention in clinical settings, an estimated 1000 inpatients fall per hospital each year. Inpatients 65 and older are known to have a higher risk for falls and injuries. The research showed that the middle-age (45-64 years of age) makes up 27% of the inpatient population and has about 42-47% of the total falls. Recent studies looked at the characteristics of inpatients across all ages while this study described characteristics specific to the middle-age inpatient. This IRB approved exploratory quantitative research study described falls using occurrence reporting data from a hospital in Central Massachusetts. The electronic medical record (EMR) data of over 439 individual falls were verified including missing variables recorded. Reports were run using IBM SPSS v21 software. The World Health Organization's (WHO), "*Risk factor model for fall in older age*", framework was adapted for hospital inpatients. It provided guidance to identify the variables used to describe the characteristics of the middle-age inpatient that fell. It included intrinsic risk factors such as age, fall history, comorbidities including mental status, and extrinsic risk factors such as wet floors, use of assistive devices and commodes. An IRB modification was requested and approved to add additional elements of total number of days of hospitalization and discharge status to support the study findings. A request to IRB for extension will be made to complete the qualitative method of the research study. Fall prevention was found to include universal interventions. Interventions should be individualized to address the anticipated physiological status of the middle-age inpatient. Nursing and the multidisciplinary team need to look at the multifactorial reasons this population is at risk to fall. This research described characteristics that help to understand this population's needs. Further research is needed in fall prevention interventions that provide this population an ability to maintain independence and autonomy in decision making but prevent falls and injuries.



Characteristics of the Middle-Age Adult Inpatient Fall

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Definitions

Fall: “an unintentional descent to floor or extension of the floor with or without Injury, including assisted falls and physiological falls (fainting)” (NDNQI, 2013, p2)

Middle-age: Period of life 45-64 years of age (Merriam-Webster’s Dictionary, 2014; Levinson, 1978; Miller, 1981)



Background: Problem Statement

Problem Statement

While predictor of falls and injuries have been studied across all adult inpatients, research has not specifically addressed fall risk characteristics in the middle-age (Mion et al.,2012; Oliver et al., 2010).



Background & Significance

- Falls one of the most reportable, serious and costly adverse event (AHRQ, 2012; CMS, 2012; Mion et al., 2012; Oliver et.al., 2012; Quigley and White, 2013; Sand-Jecklin & Sherman, 2013)
- 2014 The Joint Commission reported that falls were the second most frequently reported Sentinel Event (The Joint Commission, 2015)
- 30-51% of falls result in injuries costing \$3,500-\$27,000, increase length of stay, rehabilitation, malpractice lawsuits
 - Minor bruises, laceration's, head trauma, fractures and 1% death (Bradley et al., 2010; Oliver et al., 2010; Quigley and White, 2013)
- 65 years and older greater risk for falls and injury, work experiences and the literature shows not only the elderly fall (Williams, Szekendi, & Thomas, 2014)
- 27% of inpatient census are middle-age (U.S Census Bureau, 2012)



Literature Review

- A prospective descriptive study described characteristics of 183 inpatients who fell with a mean age of 63.4 (range 17-96) and 47% (n=86) were under age 65 (Hitcho et al., 2004)
- Retrospective quantitative study: N=25,010 patients, found 51-60 year old (n=5561 22%) had greatest number of falls (Williams et al., 2014 UHC)
- RCT of N=192 of use of an electronic Fall Prevention Toolkit (FPTK)(n=88 46%)64 or younger were less likely (p=.003) to follow interventions recommended (Dykes et al., 2010)



Purpose/Aims

Purpose: To describe fall and injury risk factors that were specific to middle-age adult inpatients.

Aims:

1. Describe the middle-age inpatient risk factors of falls and fall injury
2. Describe unit specific data, fall numbers with type of falls, injuries from falls, and prevention strategies
3. Compare fall and injury rates in the middle-age patient compared to the overall hospital adult populations ages 21-44 and 65-90 during a 30 month period
4. Qualitative data to describe the middle-age patient's perception of their fall



Conceptual Framework

- Adapted World Health Organization (WHO) *Risk Factor Model for Older Age* (WHO, 2007; Fawcett, J. , 1984 ; Hitcho et al. 2004) permission @who.int

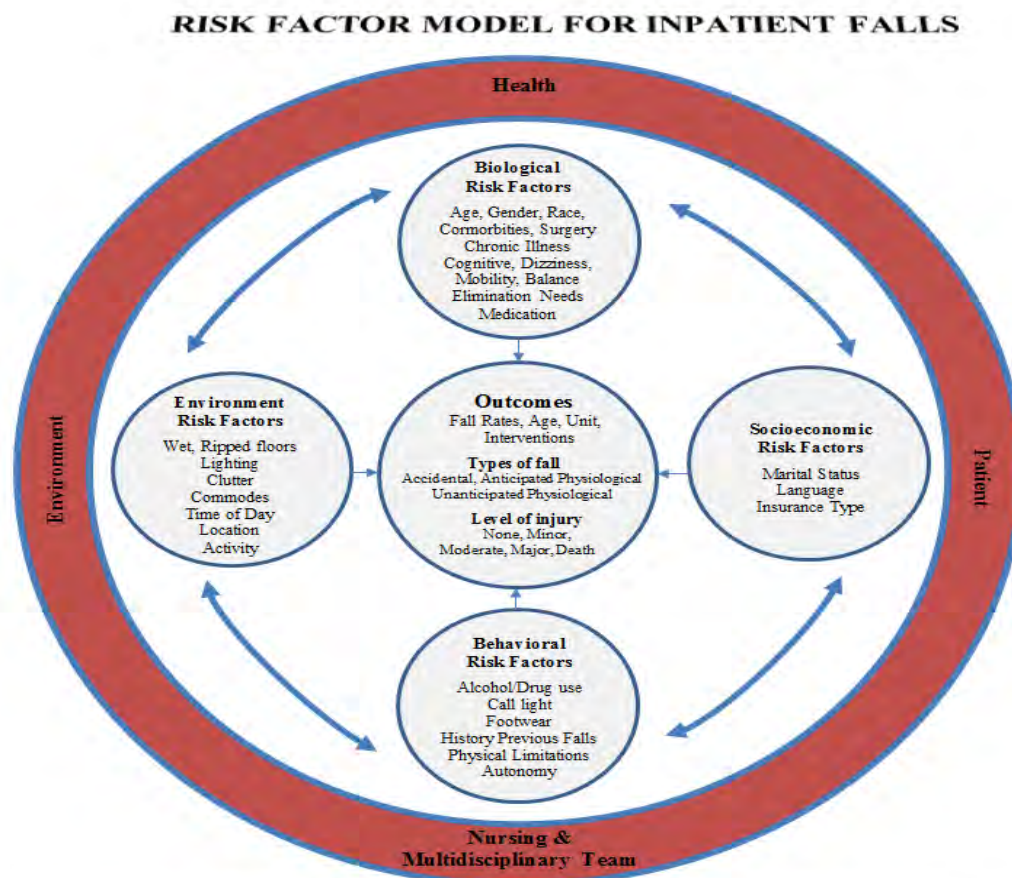


Figure 1 _adapted from the World Health Organization (WHO) 2007 http://www.who.int/ageing/publications/Falls_prevention7March.pdf



Research Method and Design

A mixed method descriptive study

- A retrospective secondary data analysis using hospitals incident reporting data
- A qualitative interview with 10-12 participants

Aims 1-3, use of secondary data

- Describe the middle-age falls, risk factors and use of interventions

Aim 4, a qualitative descriptive design

- Purposeful sample from middle-age inpatients identified daily who had reported falls



Target Population and Sample

Setting

- Large academic teaching hospital
- Inpatient admission
- Units are medical (n=6), surgical (n=4), mixed medical units (n=4), critical care (n=8), and other specific type units that include post-anesthesia care, procedural areas and emergency department (n=4)

Sample

- Aims 1 and 2, a sample of 439 falls (386 individual inpatients who fell)
- Aim 3 secondary occurrence data on number of falls and injuries that encompass adults from 21-44 and 65-90 years of age
- Aim 4 purposeful sampling of 4 middle-age patients who fell



Inclusion Criteria

Aims 1-2

- Between January 2012 and July 2014 adult inpatients aged 45-64 years old (middle-age) that had a documented fall

Aims 3

- Between January 2012 and July 2014
- Secondary data on incidence of patient falls and injuries between ages 21 and 90 years of age comparing ages 21-44; 45-64; and 65-90

Aim 4

- Patients ages 45-64 years old who had a fall during their current admission after January 1, 2015



Exclusion Criteria

Aims 1-3

- An adult patient fall on a psychiatric unit
- An adult patient fall during an outpatient appointment in the ambulatory department
- A fall by visitors, students, and staff members
- Adult patients with cognitive disabilities (dementia or developmentally challenged)

Aim 4

- Middle-age adults 6 were excluded from this study because they were unable to provide consent and 5 were discharged on day of fall



Human Subjects Consideration

- Institutional Review Board (IRB)
- Aims 1-4: data analysis used de-identified data stored on a password protected R drive
- A HIPAA waiver requested to collect data for aims 1-3 and screen for patients for aim 4
- Aim 4: HIPAA Waiver for Written consent
 - Use of an IRB/HIPAA approved Study Fact Sheet
 - Minimal risks
 - In the event patients require assistance, the Unit Manager or supervisor would be notified if support needed
 - An honorarium of \$5.00 gift card



Data Management

Aim 1 -3

- Risk Management provided data from study criteria in Excel format
- Manual data abstraction from the electronic medical record (EMR) for elements not available and to verify elements from the occurrence reporting
- Data was de-identified and transferred to IBM SPSS v21 data software for analysis stored on pass word protected drive

Aim 4

- An interview guide with probes was used
- Two audiotapes for interviews
- Tapes transcribed by a professional transcriptionist
- Review Audiotapes and transcribed reports then audiotapes will be erased



Analysis

Retrospective secondary data

- Reports run in SPSS to cross check data verifying discrepancies, data editing was a constant iterative process to assure accuracy
- Descriptive statistics, frequency, mean, standard deviation, median, range, cross tabs to describe relationship of age, Poisson regression to compare rates of falls and injuries across three age groups, units and gender, consensus validation

Qualitative descriptive

- For qualitative verification of trustworthiness of data (reliability and validity)
 - Comparative analysis, coding and theme development (Lincoln, YS. & Guba, EG. ,1985)



Patient Demographics

Frequency distribution of demographics and study variables

Aim 1

Demographics	Value
Age (years) mean=55.75 (SD 5.26)	(N=439 falls)
45-49	56 (13%)
50-54	131 (30%)
55-59	120 (27%)
60-64	132 (30%)
Male	251 (57%)
Female	188 (43%)
	(N=386 Individual Pt.)
Male	223(58%)
Female	163 (42%)
Non-Hispanic (missing 2)	362 (94%)
Marital status	
Single/ separated/divorced/widow	252 (65%)
Married/living as married	134 (35%)
Insurance status	
Private	122 (32%)
Federal/State	123 (32%)
State	114 (30%)
Uninsured	19 (5%)
Other (Automobile, Workers Comp)	8 (2%)



Characteristics

Admitting Diagnosis	N=386	Chief Complaint	N=386	Comorbidities	N=386
Respiratory	43 (11%)	AMS	59 (15%)	Hypertension	178 (46%)
Cancer	42 (10%)	GI	52 (14%)	Anxiety/Depression	155 (40%)
Drug/ETOH	37 (10%)	Respiratory	46 (12%)	Drugs/ETOH	127 (33%)
Sepsis	37 (10%)	Fall	33 (9%)	Diabetes	110 (29%)
Cardiac	31 (8%)	Cardiac	29 (8%)	Cardiac	98 (25%)
Ortho	28 (7%)	Neuro	27 (7%)	Respiratory	90 (23%)
Elective admission	13 (3%)				
Discharge Status					
Rehab /Facility	179 (46.4%)				
Home with services	104 (29.9%)				
Home no services	61 (15.8%)				
Other	27 (6.9%)				
Death	15 (3.9%)				

Values (%) N=386 individuals. Percentages do not total 100% due to rounding.

Discharge status: Other: NH, Psych, VA, Hosp. Grp. home, Hospice and Other Hospital. No deaths were from a fall.



Risk Factors

- Getting up at night to void (51.4%, n=226)
- 67.6% (n=153) falls on the evening or night shift inpatients had been identified as voiding at night
- 29.8% (131) of falls there was a history of a fall in the last three months
- 21.4% (n=94) were repeat falls
- The total length of stay (LOS) of the patients who fell had a mean of 17.70 days (SD 35.35) with a median of 10 days (range of 1-390 days).
- The majority of falls (87.69%) were also found to be “unwitnessed” similar to other fall studies (Bradley et al., 2010; Johnson, George, & Tran, 2011; Oliver et al., 2010).



Types of Falls

Aim 2

Type of Falls		Number of Falls N=439	*Risk To Fall
Accidental falls	Extrinsic environmental factors such as clutter, wet floors from a spill or urine, leaning on bedside tables, and tripping over a threshold going in or out of a bathroom or patient room, on cords and IV poles (Morse, 2002).	N=47 (11%)	(2.0%, n= 9) High Risk (.7%, n=3) Medium Risk (8.0% n=34) Low Risk
Anticipated physiological (AP)	Intrinsic and extrinsic factors such as multiple comorbidities, cognition, vision problems, gait disturbances and medications (Morse, 2002).	N=377 (85%)	(48%, n=181) High Risk (8%, n= 69) Medium Risk (25% n=108) Low Risk
Unanticipated physiological falls (UP)	Not preventable and occur due to factors that could not be predicted such as fainting, stroke, syncope, heart attack, seizure, or a pathological fracture (Halm & Quigley, 2011; Morse, 2002).	N=22 (6%)	(.7%, n=3) High Risk (.2%, n=1) Medium Risk (2.0% n=9) Low Risk
*Accidental: 1 missing, AP: 19 missing, UP: 2 missing			



Age Repeat and Outcome Variables

Description of age in relation to repeat falls and outcomes related variables (N=439)						
Age	Repeat Same Admission	Repeat Different Admission	Injury Level			
			None	Minor	Moderate	Major
45-59	4	1	38	13	4	1
50-54	11	10	90	35	4	2
55-59	8	4	86	23	10	1
60-64	9	8	99	25	8	0
Total	* 32 (7%)	21 (5%)	313 (71%)	96 (22%)	26 (6%)	4 (1%)

***3 patients fell more than once in same and repeat admissions**



Descriptive Data

Description of Fall	
Variable	Value N=439
Area of fall	
Inpatient room	296 (67%)
Bathroom	127 (29%)
Other (hallway, procedure area)	16 (4%)
In patient room	
Found on floor	193 (44%)
From chair	42 (10%)
From commode	28 (6%)
Patient room (patient reported)	22 (5%)
Fell OOB	21 (5%)
Reported activity	
Walking	84 (19%)
Getting OOB	73 (17%)
Lost balance	61 (14%)
Reaching	26 (6%)
Incontinent	12 (3%)
Urinal	11 (3%)
Falls occurred	
Shift of fall (p=.131)	
Evening	165 (38%)
Night	143 (33%)
Day	131 (30%)
24 hours after procedure	57(13%)
Within four hours of transfer	25 (8%)
Patient room were either reported or assisted falls. Documentation indicated "found on floor" with no qualifying information of area where fall was initiated.	



Interventions

Fall Prevention Interventions

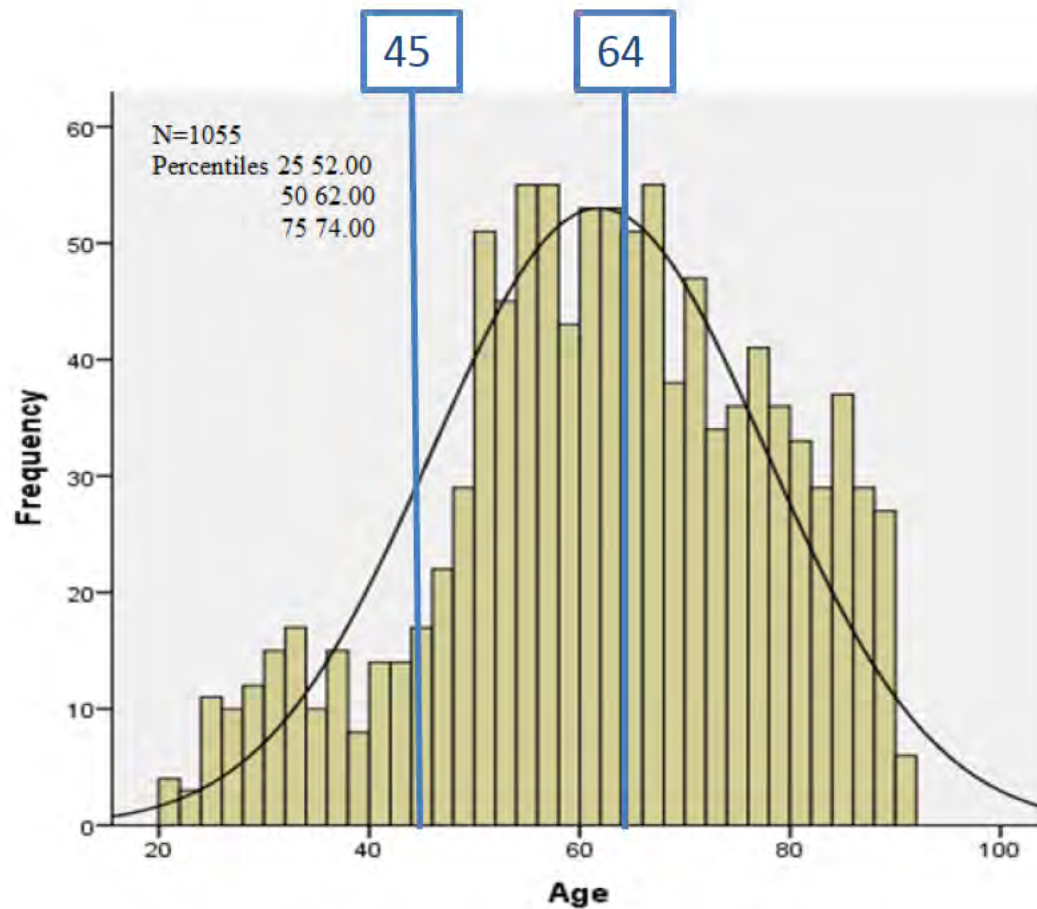
Intervention	Medical N=215	Surgical N=108	Medical-Surgical N=45	ICU N=44
Call bell	208 (96.7%)	98 (90.7%)	42 (93.3%)	41 (93.2%)
Lighting	198 (92.1%)	94 (87.0%)	41 (91.1%)	40 (90.9%)
Bed low	195 (90.7%)	91 (84.3%)	35 (77.8%)	39 (86.6%)
Footwear	165 (76.7%)	83 (76.9%)	35 (77.8%)	5 (11.4%)
Verbal reminder	154 (71.6%)	68 (69.9%)	35 (77.8%)	37 (84.1%)
Personal items	127 (59.1%)	61 (56.5%)	28 (62.2%)	4 (9.1%)
Close to nurse	122 (56.7%)	54 (50.0%)	24 (53.3%)	30 (68.2%)
Risk band	78 (36.3%)	48 (44.4%)	13 (28.9%)	11 (25.0%)
Clutter	93 (43.3%)	49 (45.4%)	23 (51.1%)	2 (4.5%)
Tab Alarm	54 (25.1%)	21(19.4%)	11 (24.4%)	5 (11.4%)
Frequent checks	53 (24.7%)	30 (27.8%)	16 (35.6%)	22 (50.0%)
Door magnet	26 (12.1%)	22 (20.4%)	5 (11.1%)	2 (4.5%)
Restraint	1 (0.5%)	3 (2.8%)	0 (0%)	5 (11.4%)
1:1/sitter	5 (2.3%)	3 (2.8%)	2 (4.4%)	0 (0%)

2.1.14 Additional staffing for 1:1/sitter coverage was discontinued at the institution studied.



Incidence of Falls

Aim 3



Bell Curve of falls in age group 21-90 mean age 61.85 (SD 15.88)



Comparison of Population

Significance of falls by age group per 1000 patient days

Age group	Falls	Pt days	Rate
21-44	129	75487	1.71
45-64	414	163293	2.54
65-90	457	174562	2.62

Age group 45-64 is the constant group. Excluded total 55 falls that occurred outside inpatient units. Age group 21-44 excluded 11 falls, age group 45-64 excluded 28 falls, and age group 65-90 excluded 16 falls.

- $n = 126$ injuries in 45-64 / $n = 143$ injuries in 65-90, $p = .626$
- Approximate total population discharges: 54% female / 46% male
- More females in age group 21-44 had falls (51%, $n = 72$)
- More males had falls in the middle-age (57%, $n = 253$) and the older age group 65-90 (55%, $n = 262$).
- Based on total population of fallers and non-fallers, this was significant at $p = .000$



Qualitative Data Findings

Aim 4: n=4

Of note: Middle-age adults: six were excluded from this study because they were unable to provide consent and five were discharged on day of fall so unable to be interviewed.

What doing: “Sat down”, “doing push-ups”, “praying”, reaching, slipped didn’t fall, trying to walk to the chair, it wasn’t a fall”

Independence and Autonomy

- “I should have asked for help. I know I fall but I have been independent since I was 15”
- “Being stubborn I did not want to ask for help”
- “I thought I could do it”
- “I got out of the chair, stepped back and slid to the floor”
- “I did not want to bother the nurse”

Getting Message Across

- “Be more specific on what to use the call bell for”
- “Include me in the education plan”
- “Help me gain more self-awareness”
- “Stress every day, by everyone RN, PCA whoever it is and make sure someone is really there when we request help”



Discussion

Aim 1: Characteristics of Middle-age

- Acutely ill population
- More men than women are falling and higher percentage are single (Hitcho et al., 2004; Oliver et al., 2010; Williams et al., 2014)
- 60% population studied had state, federal or were uninsured (Schoenborn & Heyman, 2009)
- Getting up at night to void (52%), a history of a fall in the last three months (30%) and repeat falls (21%)
- A higher percentage of falls (59%) occurred on evening/nights (Hitcho et al., 2004)
- (88%) were also found to be “unwitnessed” similar to other fall studies (Bradley et al., 2010; Johnson, George, & Tran, 2011; Oliver et al., 2010)

Aim 2:

- Findings revealed little variance between units, and interventions were basic or universal

Aim 3:

- No significant differences for inpatients age 45-64 years who fell at almost the same rate per 1000 patient days (2.54) as those 65 and older (2.62)
- 42% of inpatient falls were middle-age with the mean age of 61.8 (STD 15.85) and median age of 62 (range 21-90). In addition, the middle-age inpatient's falls resulted in injuries similar to the older age adult rates

Aim 4:

- A small sample of interviewees, descriptions of the fall experience provided some potential insight into this age group about activity at the time of the fall and need for autonomy & independence Carroll, Dykes & Hurley (2010)



Limitations/Innovation

Limitations

- Results are limited to one academic hospital
- Occurrence data requires staff to self-enter data
- The data is entered by one PI which may introduce certain bias into data collection methods
- Some missing data elements that relied on documentation
- Verification of implemented interventions was not completed
- Aim 4 was limited to 4 interviews not providing saturation
- Study is an exploratory study and may not be reflective of a universal population

Innovation

- No current studies have described the middle-age adult that falls in the inpatient setting



Conclusion

Summary:

- The secondary data analysis goal was to provide information to describe characteristics of the middle-age population to help identify patients at risk for falls and injury
- Outcome of findings can be used to help inform the multidisciplinary team decision on interventions for fall safety
- Study was guided by the conceptual framework of the WHO Fall Risk Model that was a valuable model. The model builds on an action plan for fall prevention using strategies that focus on awareness, assessment and interventions (WHO, 2007)

Recommendations:

- Nurses with the multidisciplinary team need to think differently about this population risk for falls and injury when assessing
 - Cognitive awareness
 - Age of middle-age population
 - Presence of significant other
 - Effects of a hospital physical environment
- Fall Prevention needs to be individualized based on
 - Understanding the middle-age patient need for autonomy and lack of acceptance of their limitations
 - Fall prevention should be based on individuals risk for type of fall and injury
 - This population needs to be included in their plan of care for fall safety



Thank you!

Dissertation Committee

- Chair: Jean Boucher, PhD, RN, ANP-BC
- Carol Bova, PhD, RN, ANP
- Sybil Crawford, PhD
- Patricia Quigley, PhD, MPH, ARNP, CRRN, FAAN, FAANP

Friends and Family

PhD Professors and classmates

Lynn, Paula, Laura

My QPS-R and work peers

Special thanks to David Vogel and Lindsay Knight

My Mom, Sister and friends

My Daughter and my Husband, who are the wind beneath my wings

Questions?



Thank you so much for your attention!



References

- AHRQ. (2012). Never Events. *Patient Safety Primers*. Retrieved June 1, 2014, from <http://psnet.ahrq.gov/primerHome.aspx>
- Apold, J., & Quigley, P. A. (2012). Minnesota Hospital Association Statewide Project: SAFE from FALLS. *Journal of Nursing Care Quality*, 27(10), 299-306. doi: 10.1097/NCQ.0b013e3182599d1b
- Boltz, M. (2009). Critical steps to prevent falls in hospitalized older patients. *Nursing Management*, 40(7), 14-17. doi: 10.1097/01.NUMA.0000357796.15645.c7
- Bouldin, E. L., Andresen, E. M., Dunton, N. E., Simon, M., Waters, T. M., Liu, M., . . . Shorr, R. I. (2013). Falls among adult patients hospitalized in the United States: prevalence and trends. *Journal of Patient Safety*, 9(1), 13-17. doi: 10.1097/PTS.0b013e3182699b64
- Bradley, S. M., Karani, R., McGinn, T., & Wisnivesky, J. (2010). Predictors of serious injury among hospitalized patients evaluated for falls. *Journal of Hospital Medicine*, 5(2), 63-68. doi: 10.1002/jhm.555
- Calasanti, T., Pietila, I., Ojala, H., & King, N. (2013). Men, bodily control, and health behaviors: the importance of age. *Health Psychology*, 32(1), 15-23. doi: 10.1037/a0029300
- Carroll, D. L., Dykes, P. C., & Hurley, A. C. (2010). Patients' perspectives of falling while in an acute care hospital and suggestions for prevention. *Applied Nursing Research*, 23(4), 238-241. doi: 10.1016/j.apnr.2008.10.003
- Cozart, H. C., & Cesario, S. K. (2009). Falls aren't us: state of the science. *Critical Care Nursing Quarterly*, 32(2), 116-127. doi: 10.1097/CNQ.0b013e3181a27dc0
- Clyburn, T. A., & Heydemann, J. A. (2011). Fall prevention in the elderly: analysis and comprehensive review of methods used in the hospital and in the home. *Journal of the American Academy of Orthopaedic Surgeons*, 19(7), 402-409. Retrieve from: <http://www.jaaos.org>
- CMS. (2012, 2012). Hospital acquired conditions. Retrieved December 31, 2013, from http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/Hospital-Acquired_Conditions.html
- Cox, J., Thomas-Hawkins, C., Pajarillo, E., DeGennaro, S., Cadmus, E., & Martinez, M. (2015). Factors associated with falls in hospitalized adult patients. *Applied Nursing Research*, 28(2), 78-82. doi: 10.1016/j.apnr.2014.12.003
- Currie, L. M. (2008). Fall and Injury Prevention. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses* (pp. 1-195 -191-250). Rockville (MD): AHRQ Publication No. 08-0043.
- DiBardino, D., Cohen, E. R., & Didwania, A. (2012). Meta-analysis: multidisciplinary fall prevention strategies in the acute care inpatient population. *Journal of Hospital Medicine*, 7(6), 497-503. doi: 10.1002/jhm.1917
- Dykes, P. C. (2012). Adding targeted multiple interventions to standard fall prevention interventions reduces falls in an acute care setting. *Evidence-Based Nursing*, 15(4), 109-110. doi: 10.1136/ebnurs-2012-100630
- Dykes, P. C., Carroll, D. L., Hurley, A., Gersh-Zaremski, R., Kennedy, A., Kurowski, J., . . . Lipsitz, S. (2009). *Fall TIPS: strategies to promote adoption and use of a fall prevention toolkit*. Paper presented at the AMIA Annual Symposium Proceedings.
- Dykes, P. C., Carroll, D. L., Hurley, A., Lipsitz, S., Benoit, A., Chang, F., . . . Middleton, B. (2010). Fall prevention in acute care hospitals: a randomized trial. *JAMA*, 304(17), 1912-1918. doi: 10.1001/jama.2010.1567
- Fischer, I. D., Krauss, M. J., Dunagan, W. C., Birge, S., Hitcho, E., Johnson, S., . . . Fraser, V. J. (2005). Patterns and predictors of inpatient falls and fall-related injuries in a large academic hospital. *Infection Control and Hospital Epidemiology*, 26(10), 822-827. doi: 10.1086/502500
- Fawcett, J. (1984). The metaparadigm of nursing: present status and future refinements. *Image - the Journal of Nursing Scholarship*, 16(3), 84-89. doi: 10.1111/j.1547-5069.1984.tb01393.x
- Hall, M. J., Levant, S., & DeFrances, C. J. (2012). Hospitalization for Congestive Heart Failure: United States, 2000-2010. In U. S. D. o. H. a. H. Services (Ed.), *NCHS Data Brief* (Vol.). Hyattsville, MD: National Center for Health Statistics.
- Hallstrom, I., & Elander, G. (2001). Needs during hospitalization: definitions and descriptions made by patients. *Nursing Ethics*, 8(5), 409-418. Retrieve from: <http://www.ncbi.nlm.nih.gov/pubmed/16004095>
- Halm, M. A., & Quigley, P. A. (2011). Reducing falls and fall-related injuries in acutely and critically ill patients. *American Journal of Critical Care*, 20(6), 480-484. doi: 10.4037/ajcc2011606
- Hitcho, E. B., Krauss, M. J., Birge, S., Claiborne Dunagan, W., Fischer, I., Johnson, S., . . . Fraser, V. J. (2004). Characteristics and circumstances of falls in a hospital setting: a prospective analysis. *Journal of General Internal Medicine*, 19(7), 732-739. doi: 10.1111/j.1525-1497.2004.30387.x
- Johnson, M., George, A., & Tran, D. T. (2011). Analysis of falls incidents: Nurse and patient preventive behaviours. *International Journal of Nursing Practice*, 17(1), 60-66. doi: 10.1111/j.1440-172X.2010.01907.x



References

- Lindberg, C., Fagerström, C., Sivberg, B., & Willman, A. (2014). Concept analysis: patient autonomy in a caring context. *Journal of Advanced Nursing*, n/a-n/a. doi: 10.1111/jan.12412
- Levinson, D. J. (1986). A conception of adult development. *American Psychologist*, 41(1), 3. Retrieve from: <http://graphics.tx.ovid.com.ezproxy.umassmed.edu/ovftpdf>.
- McInnes, E., & Askie, L. (2004). Evidence review on older people's views and experiences of falls prevention strategies. *Worldviews Evid Based Nurs*, 1(1), 20-37. doi: 10.1111/j.1741-6787.2004.04013.x
- Miake-Lye, I. M., Hempel, S., Ganz, D. A., & Shekelle, P. G. (2013). Inpatient fall prevention programs as a patient safety strategy: a systematic review. *Annals of Internal Medicine*, 158(5 Pt 2), 390-396. doi: 10.7326/0003-4819-158-5-201303051-00005
- Middleage. (n.d.). In *Merriam-Webster's online dictionary* (copyright @2014) Retrieved 16 Feb. 2014, from [http://www.merriam-webster.com/dictionary/middle age](http://www.merriam-webster.com/dictionary/middle%20age)
- Miller, D. A. (1981). The 'sandwich' generation: adult children of the aging. *Social Work*, 26(5), 419-423. doi: 10.1093/sw/26.5.419
- Mion, L. C., Chandler, A. M., Waters, T. M., Dietrich, M. S., Kessler, L. A., Miller, S. T., & Shorr, R. I. (2012). Is it possible to identify risks for injurious falls in hospitalized patients? *Joint Commission Journal on Quality and Patient Safety*, 38(9), 408-413. Retrieve from: <http://www.ncbi.nlm.nih.gov/pubmed/23002493>
- Morse, J. M., Morse, R. M., & Tylko, S. J. (1989). Development of a scale to identify the fall-prone patient. *Canadian Journal on Aging/La Revue canadienne du vieillissement*, 8(04), 366-377.
- NDNQI. (2013). Guidelines for Data Collection and Submission on Patient Falls. *American Nurses Association*, from <http://www.nursingquality.org/>
- NEISS. (2001-2013). Unintentional Fall Nonfatal Injuries and Rates per 100,000 (P. Statistics, and Economics Branch, Trans.). Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control
- Neugarten, B. L. (1979). Time, age, and the life cycle. *American Journal of Psychiatry*, 136(7), 887-894. doi: doi:0002-953X/79/0810887/08
- Oliver, D., Connelly, J. B., Victor, C. R., Shaw, F. E., Whitehead, A., Genc, Y., . . . Gosney, M. A. (2007). Strategies to prevent falls and fractures in hospitals and care homes and effect of cognitive impairment: systematic review and meta-analyses. *BMJ*, 334(7584), 82. doi: 10.1136/bmj.39049.706493.55
- Oliver, D., Healey, F., & Haines, T. P. (2010). Preventing falls and fall-related injuries in hospitals. *Clinics in Geriatric Medicine*, 26(4), 645-692. doi: 10.1016/j.cger.2010.06.005
- Quigley, P. A., Hahn, B., Collazo, S., Gibson, W., Janzen, S., Powell-Cope, G., . . . White, S. V. (2009). Reducing serious injury from falls in two veterans' hospital medical-surgical units. *Journal of Nursing Care Quality*, 24(1), 33-41. doi: 10.1097/NCQ.0b013e31818f528e
- Quigley, P. A., & White, S. V. (2013). Hospital-based fall program measurement and improvement in high reliability organizations. *Online Journal of Issues in Nursing*, 18(2), 5. doi: 10.3912/OJIN.Vol18No02Man05
- Sand-Jecklin, K., & Sherman, J. (2013). Incorporating bedside report into nursing handoff: evaluation of change in practice. *Journal of Nursing Care Quality*, 28(2), 186-194. doi: 10.1097/NCQ.0b013e31827a4795
- Schoenborn, C., & Heyman, K. (2009). Health Characteristics of Adults Aged 55 Years and Over: United States, 2004-2007 (D. o. H. I. Statistics, Trans.). In N. C. f. H. Statistics (Ed.), *National Health Statistics Reports* (pp. 1-32). Hyattsville, MD: .
- Shorr, R. I., Mion, L. C., Chandler, A. M., Rosenblatt, L. C., Lynch, D., & Kessler, L. A. (2008). Improving the capture of fall events in hospitals: combining a service for evaluating inpatient falls with an incident report system. *Journal of the American Geriatrics Society*, 56(4), 701-704. doi: 10.1111/j.1532-5415.2007.01605.x
- Shuey, K. M., & Balch, C. (2014). Fall Prevention in High-Risk Patients. *Critical Care Nursing Clinics of North America*, 26(4), 569-580. doi: <http://dx.doi.org/10.1016/j.ccell.2014.08.016>
- Stalhandske, E., Mills, P., Quigley, P., Neily, J., & Bagian, J. P. (2008). VHA's National Falls Collaborative and Prevention Programs Culture and Redesign. Retrieve from: <http://www.ncbi.nlm.nih.gov>.
- TheJointCommission. (2015). Sentinel Event Data summary. *Sentinel Event* Retrieved April 18, 2015, from http://www.jointcommission.org/sentinel_event.aspx
- Titler, M. G., Shever, L. L., Kanak, M. F., Picone, D. M., & Qin, R. (2011). Factors associated with falls during hospitalization in an older adult population. *Res Theory Nurs Pract*, 25(2), 127-148. doi: 10.1891/1541-6577.25.2.127
- Tzeng, H. M., Hu, H. M., & Yin, C. Y. (2011). The relationship of the hospital-acquired injurious fall rates with the quality profile of a hospital's care delivery and nursing staff patterns. *Nursing Economics*, 29(6), 299-306. Retrieve from: <http://www.nursingeconomics.net>
- U.S. Census Bureau. (2012). *Age and Sex Composition in the United States* Retrieved 16, Feb, 2014, from <http://www.census.gov/population/age/data/2012comp.html>
- van Harten-Krouwel, D., Schuurmans, M., Emmelot-Vonk, M., & Pel-Littel, R. (2011). Development and feasibility of falls prevention advice. *Journal of Clinical Nursing*, 20(19-20), 2761-2776. doi: 10.1111/j.1365-2702.2011.03801.x
- Weinberg, J., Proske, D., Szerszen, A., Lefkovic, K., Cline, C., El-Sayegh, S., . . . Weiserbs, K. F. (2011). An inpatient fall prevention initiative in a tertiary care hospital. *Joint Commission Journal on Quality and Patient Safety*, 37(7), 317-325. Retrieve from: <http://www.ingentaconnect.com/>
- WHO. (2007). WHO Global Report on Falls Prevention in Older Age. In W. H. Organization (Ed.), *Ageing and Life Course, Family and Community Health*. Geneva: World Health Organization.
- Williams, T., Szekendi, M., & Thomas, S. (2014). An analysis of patient falls and fall prevention programs across academic medical centers. *Journal of Nursing Care Quality*, 29(1), 19-29. doi: 10.1097/NCQ.0b013e3182a0cd19
- Wu, S., Keeler, E. B., Rubenstein, L. Z., Maglione, M. A., & Shekelle, P. G. (2010). A cost-effectiveness analysis of a proposed national falls prevention program. *Clinics in Geriatric Medicine*, 26(4), 751-766. doi: 10.1016/j.cger.2010.07.005

Dissemination Plan

The primary description of this dissertation work was submitted as a manuscript on October 3, 2015 to *Applied Nursing Research* for review and consideration for publication.