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Implementation of a Multifactorial Fall Prevention Protocol

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IMPLEMENTATION OF A MULTIFACTORIAL FALL PREVENTION PROTOCOL

by

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DEDICATION

I would like to dedicate this project to my family and thank them for their endless encouragement throughout this DNP program.

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I would like to thank Dr. Kessler for your constant guidance and support. Your knowledge and encouragement were greatly appreciated in the development and implementation of this project.

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ABSTRACT

According to the Joint Commission Center for Transforming Healthcare (2016), moderate to severe injuries from falls on average add 6.3 days to a hospital stay and cost approximately $14,056 per patient hospitalization. The purpose of this evidence-based practice (EBP) project was to implement a multifactorial approach to identify patients at risk for falls on admission to the orthopedic/neurosurgical unit and provide individualized interventions necessary to prevent falls. The Iowa Model of Evidence-Based Practice and Orlando's Nursing Process Discipline facilitated the implementation of this project. A total of 45 staff members on the unit were educated on the multifactorial fall protocol with a PowerPoint® presentation prior to implementation. The nurses utilized the Fall Risk Algorithm, which provided a stepwise approach to fall risk assessment and interventions. Pre and post-implementation data were collected to compare fall and fall injury rates. The desired outcomes for this project were to reduce the fall and fall injury rates in hospitalized patients. Another desired outcome was to improve staff and patient compliance with the multifactorial fall prevention interventions. Staff compliance consisted of visual checks that demonstrated improved results when comparing the items to pre and post implementation. The gait belt in the patient's room (p = 0.000) and the presence of a walking device (p = 0.043) had a significant improvement between pre and post implementation. There was improvement from pre to post implementation for patient wristbands (p = 0.313), socks or footwear use (p = 0.579), bed or chair alarms (p = 0.229), bed locked in the low position (p = 0.316), call light and items within reach (p = 0.155), and patient validation of understanding (p = 0.147). Staff compliance included nursing documentation. Staff demonstrated a slight improvement for fall education documentation from pre (n = 52) and post (n = 54) implementation ($\chi^2(1)$ = 0.080, p = 0.777). The nursing staff received pre and post-test questions after the educational session. There was a significant improvement between the means of the two groups for question one (p = 0.001) and for question three (p = 0.012). There

was no significant difference between the groups for question two (p = 0.142). There were significant findings found for patient compliance. Frequency of falls occurring with alert and oriented patients and confused patients produced a significant deviation from the hypothesized values (p = 0.022); more alert and oriented patients fell. A significant deviation was found (p = 0.050) when comparing frequency of falls occurring with opioids; more patients on opioids fell. The mean fall number during the months of October, November, and December from 2014 and 2015 (p = 0.802) and 2015 and 2016 (p = 1.000) showed no significant difference. The frequency of falls occurring with injury was examined. Significant deviation from the hypothesized values was found ($\chi^2(1) = 9.783$, p = 0.002); injuries rarely occurred with falls. There were no significant differences among the fall rate and injury rate throughout October, November, and December and the years of 2014, 2015, and 2016; however there was improved use of fall risk interventions demonstrated by the improved rates of the visual checks following the multifactorial approach. Implications for practice include the nursing staff continuing to demonstrate the multifactorial approach to fall prevention with the fall risk algorithm that will be used on the unit and implemented on other units in the hospital system.

CHAPTER 1

INTRODUCTION

Falls are a leading cause of hospital-acquired injury and often complicate or lengthen hospitalizations (National Guideline Clearinghouse [NGC], 2012). The purpose of fall assessment and interventions is injury prevention and safety. There is an increased focus on fall injury prevention and safety because public reporting of serious injury and death are available (NGC, 2012). There is a variation of practices that have demonstrated a decrease in the occurrence of falls in hospitals; however, these practices are not used systematically in all hospitals (Agency for Healthcare Research and Quality [AHRQ], 2013).

There are three types of falls that can occur in the hospital and preventing injury is always a priority. These falls include accidental, anticipated physiologic, and unanticipated physiologic (Morse, 2002). Accidental falls are falls that occur when patients fall unintentionally because of an unsafe environment. Most fall prevention strategies are targeted toward this type of fall. Morse (2002) stated that patients who have an accidental fall cannot be identified before the fall and do not score at risk of falling on a predictive instrument. Interventions that improve environmental safety will help decrease or prevent accidental falls (AHRQ, 2013). Anticipated physiologic falls are falls that occur in patients who have fall risk factors that can be identified in advance, such as abnormal gait, altered mental status, frequent toileting needs, or high-risk medications (AHRQ, 2013). These patients are expected to fall. The majority of falls in the hospital are anticipated physiologic falls (AHRQ, 2013). Interventions for prevention include addressing risk factors. Unanticipated physiologic falls occur when the physical causes of the falls are not demonstrated in the patient's risk factors for falls (Morse, 2002). An unanticipated physiologic fall is caused by a physical condition, such as a seizure, stroke, or syncopal episode (AHRQ, 2013). The physical conditions cannot be predicted until the patient falls. Injury prevention measures in case of recurrence and appropriate post-fall care are key interventions for an unanticipated physiologic fall (AHRQ, 2013).

Several types of fall prevention interventions have been evaluated in studies, including single interventions, multiple interventions, and multifactorial interventions. Single interventions consist of one component being utilized in fall prevention, such as medication review. Multiple interventions include the same combination of interventions that are provided to all participants (Cameron et al., 2012). For example, all patients participating in supervised exercise and receiving regular toileting consist of multiple interventions. Multifactorial interventions are based on individual assessment of risk and multiple-component interventions are delivered (Cameron et al., 2012). Multifactorial interventions are considered to be “bundles” of interventions, such as post-fall reviews, patient education, staff education, and toileting (Oliver, Healey, & Haines, 2010). Evidence demonstrates a multifactorial approach specific to the patient is best practice (Ang, Mordiffi, & Wong, 2011; Cameron et al., 2012; Choi, Lawler, Boenecke, Ponatoski, & Zimring, 2011; NGC, 2012; Spoelstra, Given, & Given, 2012; Trombetti, Hars, Herrmann, Rizzoli, & Ferrari, 2013).

The goal of this evidence-based practice (EBP) project will be to provide a multifactorial approach that can be systematically utilized on an inpatient orthopedic/neurosurgical unit and then be potentially utilized throughout the hospital system. The multifactorial approach will be utilized to identify patients at risk for falls and provide individualized interventions necessary to prevent falls.

Background

In 2008, the Centers for Medicare and Medicaid Services (CMS) identified falls and trauma as hospital-acquired conditions, which may include fractures, dislocations, intracranial injuries, crushing injuries, burns, and other injuries (CMS, 2015). The CMS do not cover the cost of care as a consequence of an inpatient fall, on the presumption that falls are preventable (Spoelstra et al., 2012). In 2008, the Joint Commission also created the Joint Commission

Center for Transforming Healthcare, which is a center that includes leading hospitals and health care organizations that address critical safety and quality problems, including patient falls (Joint Commission Center for Transforming Healthcare, 2016). According to the Joint Commission Center for Transforming Healthcare (2016), moderate to severe injuries from falls on average, add 6.3 days to a hospital stay and cost approximately $14,056 per patient hospitalization. Hundreds of thousands of patients in hospitals fall every year and 30-50% result in injury.

In 2015, one of the Joint Commission's national patient safety goals was to reduce the risk of patient and resident harm resulting from falls (The Joint Commission, 2015). The five elements of performance included (a) assessing the patient's risk for falls, (b) implementing interventions to reduce falls based on the patient's assessed risk, (c) educating staff on the fall reduction program, (d) educating the patient and family on individualized fall reduction strategies, and (e) evaluating the effectiveness of fall reduction activities, such as assessment, interventions, and education (The Joint Commission, 2015). The Joint Commission (2015) further indicated the outcome indicators that are to be utilized in fall evaluations, which included decreased number of falls and decreased number and severity of fall-related injuries.

The Joint Commission Center for Transforming Healthcare also launched a fall prevention project in August 2015, called the Preventing Falls Targeted Solutions Tool. The project includes an online application that guides an organization through the process by measuring the current state, analyzing and discovering causes, implementing solutions, and sustaining and spreading improvements (Joint Commission Center for Transforming Healthcare, 2016). Organizations who have utilized this tool have reduced the rate of patient falls by 35% and the rate of patients injured in a fall by 62% (Joint Commission Center for Transforming Healthcare, 2016).

Patient falls and patient falls with injury are data reported in the National Database of Nursing Quality Indicators (NDNQI), which was established by the American Nurses Association in 1998 (Montalvo, 2007). The NDNQI is the national nursing database that distributes quarterly and annual data of the structure, process, and outcome indicators that are used to influence nursing policy and improve nursing care at the unit level (Montalvo, 2007). Facilities join NDNQI as part of their Magnet status quality improvement program and many others join because they believe in the value of evaluating the quality of nursing care and improving outcomes (Montalvo, 2007).

The NDNQI defines a fall as “an unplanned descent to the floor (or extension of the floor, e.g., trash can or other equipment) with or without injury to the patient, and occurs on an eligible reporting nursing unit. All types of falls are to be included whether they result from physiological reasons (fainting) or environmental reasons (slippery floor). Include assisted falls- when a staff member attempts to minimize the impact of the fall” (NDNQI, 2010, p. 13). According to NDNQI, injury level must also be established and reported to the NDNQI based on the following:

- “None- patient had no injuries (no signs or symptoms) resulting from the fall, if an x-ray, CT scan or other post fall evaluation results in a finding of no injury
- Minor- resulted in application of a dressing, ice, cleaning of a wound, limb elevation, topical medication, bruise or abrasion
- Moderate- resulted in suturing, application of steri-strips/skin glue, splinting or muscle/joint strain
- Major- resulted in surgery, casting, traction, required consultation for neurological (basilar skull fracture, small subdural hematoma) or internal injury (rib fracture, small liver laceration) or patients with coagulopathy who receive blood products as a result of the fall
- Death- the patient died as a result of injuries sustained from the fall (not from physiologic events causing the fall)” (NDNQI, 2010, p. 15).

The work of the Joint Commission and NDNQI are significant in the regulation of fall prevention. The Joint Commission recognizes that inpatient falls are a prevalent safety problem. The Joint Commission also identifies effective approaches to fall prevention, including the development of the Joint Commission Center for Transforming Healthcare. The NDNQI consists of patient falls and patient falls with injury. The NDNQI data are utilized to assess quality of nursing care and identify necessary improvements in fall prevention (Montalvo, 2007). Both the Joint Commission and NDNQI influence fall prevention policy in institutions. Patient outcomes are improved by decreasing or preventing the number of inpatient falls and falls with injury.

Statement of the Problem

The problem addressed in this project is that patient falls continue to remain a challenge in hospitals. There may be protocols and specific interventions in place in regard to falls prevention, however these components are not effective if patients are continuing to fall. This project will specifically examine the current falls prevention policy, interventions involved, and the number of falls and falls with injury on an inpatient orthopedic/neurosurgical unit.

Data from the Literature

Falls are a widespread concern in hospital settings. Oliver et al. (2010) stated that there are between 3 and 5 falls per 1000 bed-days, which represent approximately a million inpatient falls occurring in the United States each year. As a result, falls are considered one of the most commonly reported adverse events, with increasing patient morbidity and mortality and costs of healthcare (Aydin, Donaldson, Aronow, Fridman, and Brown, 2015). A total of 1% to 3% of falls in hospitals result in a fracture; however, minor injuries can cause distress and delay rehabilitation for many patients (Oliver et al., 2010).

There are multiple risk factors related to falls in the inpatient population. The patient-specific factors include: a history of falling, muscle weakness, agitation, confusion, sedative medication, postural hypotension or syncope, and urinary incontinence or frequency (Oliver et al., 2010). The impact of environmental risk factors also needs to be recognized; environmental risks correlate with patient-specific risks. Oliver et al. (2010) identified several studies, which consistently suggest that fall risk increases with advanced age, with the highest rate for those who are older than 85 years.

Evidence continues to demonstrate that the most appropriate approach to falls prevention in the hospital environment includes multifactorial interventions (Ang et al., 2011; Cameron et al., 2012; Choi et al., 2011; NGC, 2012; Spoelstra et al., 2012; Trombetti et al., 2013). Cameron et al. (2010) defined multifactorial interventions as two or more components of interventions that are based on individual assessment of risk. Oliver et al. (2010) determined components of multifactorial interventions differ widely; however, most commonly identified in successful trials include patient education, staff education, footwear advice, post-fall review, and toileting. An initial assessment is performed and then interventions are provided. The interpretation of the multifactorial interventions is often complex because of the variation in components, duration and intensity of interventions, and how interventions are implemented (Cameron et al., 2010).

Multifactorial interventions involving increased observation and surveillance have been found to be effective in preventing falls in hospitals (NGC, 2012). The NGC (2012) stated that best practice in fall reduction includes: falls risk assessment, fall risk directed interventions, visual identification of patients at high risk for falls, and standardized multifactorial education, which consists of visual tools for patients, family, and staff.

Data from the Clinical Agency

The clinical agency for this EBP project is a not-for-profit hospital of Trinity Health that consists of 254 inpatient rooms, located in North Central Indiana. The project will be implemented on the 32 bed orthopedic/neurosurgical unit. This unit was chosen for the project because the unit is easily accessible to the project leader. The manager continuously discussed patient falls at monthly staff meetings, and falls were a problem the project leader recognized.

Fall data from this unit and hospital support the need for the project. Previously collected data on the orthopedic/neurosurgical unit demonstrate that in 2014 there were 17 falls with two minor injuries and in 2015 there were 39 falls with two minor injuries. The overall inpatient data in this hospital system, excluding pediatric, obstetrics, labor and delivery, and outpatient units, for 2014 consists of 158 falls with 18 minor injuries and two major injuries. In 2015, the hospital system had 271 falls with 37 minor injuries and three major injuries.

Purpose of the EBP Project

The purpose of this EBP project is to implement a multifactorial approach to identify patients at risk for falls on admission to the unit and then provide individualized interventions necessary to prevent falls. The project will be accomplished through the development of a fall prevention protocol that focuses on best practice. The desired outcome of this project is to reduce the fall rate and fall injury in hospitalized patients, which will thereby reduce hospital costs and length of stay. Another desired outcome will be to improve staff and patient compliance with fall prevention interventions. The compelling clinical question for this project is: What is best practice for fall prevention in hospitalized patients?

This EBP project addresses the PICOT question: In hospitalized patients on the orthopedic/neurosurgical unit (P), what is the impact of a multifactorial approach with best practice fall prevention interventions (I) when compared to usual care (C) on fall rate, fall injury, and staff and patient compliance (O) over the course of three months (T)?

Significance of the Project

Falls in hospitals are associated with increased length of stay, increased use of greater health care resources, and higher rates of discharge to institutional care (Oliver et al., 2010). It is imperative that patients receive multifactorial interventions based on individual assessment. The goal of this project is to reduce the fall rate and fall with injury rate by preventing falls and fall injuries. As a result, morbidity and mortality will be prevented along with a reduction in cost for the hospital and improved patient outcomes. Patients also will avoid functional impairment, pain, and distress that result from a fall.

CHAPTER 2

THEORETICAL FRAMEWORK, EBP MODEL, AND REVIEW OF LITERATURE

This project will be guided by the results of an extensive literature search and review of literature. The Iowa Model of Evidence-Based Practice will facilitate the implementation of this project. Orlando's Nursing Process Discipline will be utilized to address nursing functions to meet patients' immediate needs.

Theoretical Framework

The theoretical framework that will be utilized for this project is Orlando's Nursing Process Discipline. Ida Jean Orlando Pelletier was born in 1926 and had a career as a practitioner, educator, consultant, and researcher in nursing (George, 2010). The focus of her work was interaction and she describes the nursing process based on the interaction between a patient and a nurse. Orlando's own nursing process discipline was developed through research and presented in two books. Her initial work, *The Dynamic Nurse-Patient Relationship: Function, Process and Principles*, was originally published in 1961 (Orlando, 1961).

There are several major concepts presented by this theory. One concept is that nursing is a unique, independent, and disciplined profession (George, 2010). The purpose of this theory is to meet the patient's immediate need for help that is demonstrated by behavior. Orlando (1990) stated there are three basic elements of a nursing situation, which include the behavior of the patient, the reaction of the nurse, and the nursing actions designed for the patient's benefit. The interaction of these elements is Orlando's nursing process.

Patient behavior is the concept that initiates the nursing process discipline. Behavior may be verbal or nonverbal. Verbal behavior encompasses patient's language, which may include: complaints, requests, refusals, demands, questions, statements, or comments (Sampoornam, 2015). Nonverbal behavior can include physiological manifestations, such as heart rate, perspirations, urination, edema, and motor activity such as smiling, walking, and avoiding eye contact (George, 2010). Nonverbal behavior can also be vocal, including: sobbing, laughing, shouting, and sighing. The patient's behavior reflects distress when a need cannot be resolved.

Patient behavior stimulates nurse reaction. Orlando (1990) stated that the nurses' reaction consists of three aspects (a) perceptions of the patient's behavior, (b) thoughts stimulated by the perceptions, and (c) feelings in response to the perceptions and thoughts. The nurse's reaction includes perception, thought, and feeling to the patient's behavior, which occur automatically and simultaneously. The nurse shares the reaction with the patient to identify the need for help and the appropriate action.

Finally, this process leads to the nurse's action. The nurse can act in two different manners: automatic or deliberative. Only a deliberative nursing action fulfills the professional function to meet a patient's immediate need (George, 2010). Automatic actions are most likely to be done by nurses concerned with carrying out physician's orders, routines of patient care, or general principles for protecting health. The deliberative action is considered to be a disciplined professional response (Sampoornam, 2015). After this deliberative action, the nurse verifies with the patient that the action has been effective. The nurse recognizes the patient's need has been met by noting the presence or absence of improvement in the patient's presenting behavior (Orlando, 1990). In the absence of improvement, the nurse understands the patient's need has not been met and the process begins all over again with the presenting behavior that is observed (Orlando, 1990).

The characteristics of the nursing process and Orlando's Nursing Process Discipline are similar. The assessment phase of the nursing process corresponds to the sharing of the nurse reaction in Orlando's Nursing Process Discipline (George, 2010). Patient behavior initiates assessment. The collection of data comprises information relevant to identifying the patient's need for help (George, 2010). Nursing diagnosis is the product of analysis in the nursing process. Through the exploration of the nurse's reaction with the patient, the need for help is identified. The outcomes and planning phases of the nursing process involve writing goals and objectives and deciding on appropriate nursing actions, which correspond to the nurse action phase of Orlando's process (George, 2010). The goal is to always relieve the patient's immediate need for help with the objective of improving the patient's behavior. Implementation involves carrying out the planned actions (Sampoornam, 2015). The nursing process considers all possible effects of the action on the patient, while Orlando's Nursing Process Discipline is concerned with the effectiveness of action involved in the immediate need for help (George, 2010). Evaluation in both processes is based on objective criteria. This phase is fundamental in Orlando's action phase. The nurse must evaluate its effectiveness in order for an action to be deliberative (Sampoornam, 2015). If the nurse fails to evaluate, ineffective actions can result, including failure to meet the patient's need and increase in the cost of nursing care and materials (George, 2010).

Application to EBP Project

Orlando's Nursing Process Discipline is an appropriate theoretical framework for this EBP project. The nurse reaction and action can be directly applied to patients who exhibit behavior that is related to an increased fall risk. Abraham (2011) stated that Orlando's theory will help nurses achieve successful patient outcomes, such as fall reduction, and provides a guideline for nurses to utilize when a fall risk is evident. A patient who is at risk for falls is in distress and can exhibit a variety of verbal and nonverbal behaviors. Patients may question why they cannot get out of bed or refuse to call for assistance when ambulating or going to the bathroom. Patients are often in distress when they are hospitalized. They often have feelings of helplessness and loss of independence. Patients may have physical or psychological limitations that increase their fall risk.

During the assessment phase, the nurse assesses the patient's behavior and then shares the reaction to the patient's behavior. For example, if the nurse notices that the patient is refusing to seek assistance to go to the bathroom and exhibits urinary urgency when ambulating, a nurse reaction will be stimulated. The nurse's perception includes hearing the bed alarm and seeing the patient ambulating to the bathroom quickly. The nurse's thought comprises of thinking the patient has urinary urgency and is at a fall risk. The nurse's feeling is of concern for the patient's safety. The nurse then shares this reaction with the patient. The patient agrees that this reaction is correct because the patient does not want to keep bothering the staff and does not want to be incontinent.

Since Orlando's process only deals with one need at a time, the predominant need is the need to call for assistance to the bathroom. The nursing diagnosis includes risk for falls. The outcomes and planning phases include the nurse creating a care plan that comprises patient education on fall prevention. The implementation phase includes the nurse carrying out the planned action, which is the nurse implementing the fall risk intervention of patient education. The nurse then evaluates the effectiveness of the patient education. The patient called for assistance to go the bathroom and continued to do so, thus validating that the action was effective.

Orlando's Nursing Process Discipline is important in the assessment for fall risk and the implementation of fall risk interventions. The concepts of the theory guide the nurse through the stages of the interaction between a nurse and patient encounter. This theory applies to all patient behaviors that may lead to distress and therefore, result in an increased fall risk. Fall prevention is an immediate need.

Strengths and Limitations

There are many strengths of Orlando's Nursing Process Discipline in relation to this EBP project. This theoretical framework guides nurses through interactions with patients. This theory ensures that patients will be treated as individuals and they will have constant input in their care (George, 2010). This interaction is essential for the project because patients should be included in their care and also have individualized fall interventions. This theory also prevents inaccurate diagnoses or ineffective plans because the nurse has to explore the reaction with the patient

(George, 2010). This project involves forming a fall prevention plan and it is essential for this plan to be effective. Evaluation of the interventions will also be necessary. Another strength is that finding and meeting the patient's need is broad and encompasses nurses working in all practice settings and in all specialty areas (George, 2010). This strength is a strong aspect for the project because the hope is that the project will produce a significant change in fall risk and will be implemented throughout the hospital.

One limitation of Orlando's theory is that it is focused only on the interaction with the individual. It is often important and necessary for the nurse to also interact with family members and provide education on fall prevention and fall risk. This theory also focuses on conscious patients and patients who are able to communicate. According to Orlando's theory, the nurse needs to be able to share the reaction with the patient and the nurse must ask the individual about the behavior expressed in order to obtain correction or verification (George, 2010). This communication is a limitation because fall prevention is also applied to patients who are unconscious or unable to communicate effectively with nurses.

Another limitation is that according to Orlando, only one need is dealt with at a time. The nurse may observe more than one immediate need. There can be several behaviors that cause distress and increase fall risk. This limitation can be overcome through a complete fall risk assessment and multifactorial interventions specific to the patient exhibiting behavior. This theory also does not mention other nurse roles (George, 2010). Orlando focuses on the interactive role of the nurse and patient. Other nursing roles involved in the project include: clinician, researcher, leader, educator, and consultant.

EBP Model of Implementation

The Iowa Model of Evidence-Based Practice will be utilized for this EBP project because it translates research findings into clinical practice through structured steps. The original model was introduced in 1994 and was later revised into the steps described in 2001 (Titler et al., 2001). The original model was the Iowa Model of Research-Based Practice to Promote Quality

Care and the revised model included a name change from “Research-Based Practice” to “Evidence-Based Practice” (Titler et al., 2001). At the time, evidence-based practice was recently being used in the nursing literature and there was a need to identify the application of research findings with the use of other types of evidence (Titler et al., 2001). The original model was revised to encompass new terminology and feedback loops, address changes in the health care market, and support the use of other types of evidence when research findings were unavailable to guide practice (Titler et al., 2001). The revised model includes several feedback loops, additional decision points, and revised terms used to describe problem and knowledge focused triggers.

The first step in the Iowa Model is to recognize a problem-focused trigger or a knowledge-focused trigger where an EBP change may be warranted (Brown, 2014). The next step is to determine whether the problem is a priority for the organization, department, or unit (Brown, 2014). The following step is to form a team that consists of individuals who will develop, evaluate, and implement the EBP change (Brown, 2014). The next step is to gather pertinent research related to the desired practice change. This step consists of forming a good PICOT question and then conducting a literature search for studies that pertain to the question (Brown, 2014). The following step is that research is critiqued and synthesized for use in practice. Then, the team needs to decide if sufficient research exists to implement a practice change. If the majority of the criteria is met, the next step would be to implement the intervention into a pilot practice change. If adequate research does not exist, an actual research study might be conducted. Following the pilot practice change, the team will ensure that the change is appropriate for adoption in practice. Then the change will be initiated in practice and the final step is the evaluation of change (Brown, 2014).

Application to EBP Project

The Iowa Model of Evidence-Based Practice was chosen for this project because it can help organize the practice change and provide a step-by-step process on how to implement a change (Brown, 2014). A problem-focused trigger was first identified, which included patient fall rate. It was also determined that this problem is a priority for the organization. The team will help develop, evaluate, and implement the EBP change. Members of the team will consist of the project leader, project advisor, nurse manager, nurse supervisor, nursing staff, and education department leader. The PICOT question was formed and a thorough literature search was conducted.

Next, the evidence was appraised and it was determined that there was sufficient research to implement a change. The implementation of the intervention into a pilot practice change will involve submission for review at Valparaiso University's IRB and the organization's IRB. Following this step, it will be determined if the change will be appropriate for adoption into practice and if yes, the change will be implemented. Finally, the change will be evaluated. The structure process and outcome data will be monitored and analyzed.

Strengths and Limitations

One strength of the Iowa Model is that nurses find it to be intuitively understandable and it is utilized in many health care organizations and academic settings (Brown, 2014). This model was easily applicable to the EBP project and provided specific steps to follow. Another strength is that the model focuses on the problem through identified triggers. The Iowa Model also concentrates on the evidence through the literature search, evidence appraisal, synthesizing the evidence, and then determining if there is sufficient evidence to implement a practice change (Brown, 2014). One limitation is that the model does not provide a framework for data collection methods. A list of appraisal tools and steps to synthesize the evidence may also be beneficial and could further improve this model.

Literature Search

An extensive literature search was conducted using multiple databases including CINAHL, MEDLINE (via EBSCO), ProQuest, Cochrane Library, Joanna Briggs Institute, and National Guideline Clearinghouse. Numerous keywords and medical subject headings were tested during the literature search. The final set of terms for CINAHL and MEDLINE included (MM “Accidental Falls/PC”) AND (orthopedic* OR orthopaedic* OR hospital* OR ward* OR unit* OR floor* OR “health system*” OR institution*) AND rate* OR injur* AND educat* OR assess*. A list of the search terms and numbers of articles found in each database is located in Table 2.1.

Based on titles and abstract reviews, there were a total of 221 relevant sources eligible for inclusion. The project leader read the 221 abstracts and 54 were chosen for literature review based on inclusion criteria. After reviewing the 54 sources, the project leader selected a total of nine articles based on the level of evidence and inclusion criteria. Inclusion criteria included articles that were published between 2011-2016, English language, scholarly or academic journals, and peer reviewed journals. The published date range from 2011-2016 was chosen because a high quality guideline was found from the NGC, published in 2012. This guideline is relevant to this project, so the literature search focused on evidence that was published beginning in 2011. There was also a significant amount of evidence on falls, so having a shorter date range proved to be beneficial to finding the most relevant and recent data.

Articles were included if they pertained to the adult population, hospitalized patients, focused on fall prevention or fall interventions. Exclusion criteria included evidence that focused specifically on pediatric or newborn populations, psychiatric patients, patients with multiple sclerosis, individuals with chronic obstructive pulmonary disease, individuals with Parkinson’s disease, falls in people after stroke, and falls in workers. Articles were also excluded if they were specific to homes, people living in the community, nursing homes, assisted living facilities, long-term care facilities, or primary care offices. If hospitals were included with these settings, these articles were then considered.

Table 2.1

Literature Search Results

Database	Search Terms	Limiters	Articles Found	Relevant	Duplicate Articles	Articles Used
CINAHL	(MM “Accidental Falls/PC”) AND (orthopedic* OR orthopaedic* OR hospital* OR ward* OR unit* OR floor* OR “health system*” OR institution*) AND rate* OR injur* AND educat* OR assess*	2011-2016, English language, scholarly (peer reviewed) journals	75	29	0	2
MEDLINE (via EBSCO)	(MM “Accidental Falls/PC”) AND (orthopedic* OR orthopaedic* OR hospital* OR ward* OR unit* OR floor* OR “health system*” OR institution*) AND rate* OR injur* AND educat* OR assess*	2011-2016, English language, academic journals	221	115	1	2
ProQuest	mesh(accidental falls) AND (orthopedic* OR orthopaedic* OR hospital* OR ward* OR unit* OR floor* OR "health system*" OR institution*) AND (rate* OR injur*) AND (educat* OR assess*)	2011-2016, English language, peer reviewed, scholarly journals	347	70	0	3
Cochrane	accidental falls (MeSH)	2011-2016, Cochrane Reviews	6	1	0	1
Joanna Briggs Institute	“accidental falls”	2011-2016	12	2	0	0
National Guideline Clearinghouse	“accidental falls”	2011-2016	15	4	0	1

Levels of Evidence

A total of nine sources of evidence were selected to be included in the review of literature, which consisted of two systematic reviews, one integrative review, three randomized controlled trials (RCTs), one qualitative study, one controlled study, and one guideline. The nine sources were each assigned a level based on the Johns Hopkins tool. The Johns Hopkins tools were utilized to level evidence from level I to level V, with level I being the highest level of evidence and level V being the lowest level of evidence (Dearholt & Dang, 2014). The nine sources in the review of literature were each appraised according to the Johns Hopkins Nursing Evidence-Based Practice Research Evidence Appraisal Tool or the Non-Research Evidence Appraisal Tool (Dearholt & Dang, 2014).

The Johns Hopkins Research Evidence Appraisal Tool applies to the first three levels. Level I evidence includes RCTs, experimental studies, systematic reviews with RCTs, and systematic reviews with meta-analysis or meta-synthesis with RCTs (Dearholt & Dang, 2014). Level II evidence is quasi-experimental and includes systematic reviews and systematic reviews with meta-analysis or meta-synthesis that have a combination of RCTs and quasi-experimental studies or are quasi-experimental studies only (Dearholt & Dang, 2014). Level III evidence is non-experimental. Level III evidence also applies to systematic reviews and systematic reviews with meta-analysis or meta-synthesis that have a combination of RCTs, quasi-experimental and non-experimental, or non-experimental only and also if any or all of the included studies are qualitative (Dearholt & Dang, 2014).

The Johns Hopkins Non-Research Evidence Appraisal Tool includes level IV and level V evidence (Dearholt & Dang, 2014). Level IV evidence consists of clinical practice guidelines or a consensus or position statement. Level V consists of a literature review or an expert opinion. Level V also consists of organizational experience, including quality improvement, financial evaluation, and program evaluation (Dearholt & Dang, 2014).

The project leader ranked the literature by level of evidence. One systematic review, in which all studies included RCTs, is considered level I evidence (Cameron et al., 2012). The other systematic review is level II evidence because this review included a combination of RCTs and quasi-experimental studies (Choi et al., 2011). One guideline is also considered level IV evidence (NGC, 2012). Three RCTs are level I evidence (Ang et al., 2011; Haines et al., 2011; Hill et al., 2015). One integrative review is also considered level III evidence (Spoelstra et al., 2012). One controlled study is level II evidence (Trombetti et al., 2013). One descriptive, correlational, retrospective study is level III evidence (Cox et al., 2015).

Appraisal of Relevant Evidence

The nine studies in the literature review were also appraised with the Johns Hopkins Research and Non-Research Evidence Appraisal Tools. These tools include quality ratings based on quality appraisal. A grade of A is high quality, B is good quality, and C is low quality or major flaws (Dearholt & Dang, 2014). A grade A includes consistent, generalizable results, definitive conclusions, sufficient sample size, adequate control, and consistent recommendations based comprehensive literature review. A grade B comprises reasonably consistent results, sufficient sample size, some control, fairly definitive conclusions, reasonably consistent recommendations based on a fairly comprehensive literature review. A grade C includes little evidence with inconsistent results, no conclusions drawn, and an insufficient sample size (Dearholt & Dang, 2014).

For the Johns Hopkins Non-Research Evidence Appraisal Tool, level IV evidence, a grade A is high quality and consists of material that is sponsored by an official organization or agency with documentation of a search strategy, consistent results, national expertise clearly evident, development or revision within the last 5 years, and definitive conclusions. A grade B is good quality and consists of a reasonably thorough search strategy, national expertise clearly evident, development or revision within the last five years, evaluation of strengths and limitations, and fairly definitive conclusions. A grade C is low quality or major flaws, in which the material is not sponsored by an official organization or agency; undefined, poorly defined, limited literature search strategy; insufficient evidence; conclusions not drawn; not revised within the last five years; and no evaluation of strengths and limitations (Dearholt & Dang, 2014). The details of the evidence including outcomes and findings for this project are demonstrated in the Appraisal of Evidence Table 2.2.

Level I evidence. Cameron et al. (2012) performed a systematic review to assess the effectiveness of interventions intended to reduce falls in older patients in care facilities and hospitals. This systematic review included 60 RCTs. Cameron et al. (2012) identified that the tested exercise interventions in care facilities were inconsistent and there was no difference between the intervention and control groups in rate of falls RaR 1.03, 95% CI [0.81, 1.31] or risk of falling RR 1.07, 95% CI [0.94, 1.23]. Vitamin D supplementation reduced the rate of falls RaR 0.63, 95% CI [0.46, 0.86], but not the risk of falling RR 0.99, 95% CI [0.90, 1.08]. Additional physiotherapy did not significantly reduce rate of falls RaR 0.54, 95% CI [0.16, 1.81] but there was a significant reduction in the risk of falling RR 0.36, 95% CI [0.14, 0.93]. Overall, multifactorial interventions in hospitals reduced the rate of falls RaR 0.69, 95% CI [0.49, 0.96] and risk of falling RR 0.71, 95% CI [0.46, 1.09], although the evidence for risk of falling was inconclusive. Cameron et al. (2012) concluded that vitamin D supplementation in care facilities is effective in reducing falls. Multifactorial interventions reduce falls in hospitals. Exercise in hospital settings appear to be effective, but the effectiveness in care facilities is uncertain due to conflicting results.

Ang et al. (2011) conducted a prospective RCT in an acute care hospital in Singapore. The aim was to examine the effectiveness of a targeted multiple intervention strategy in decreasing the number of high-risk patient falls. Participants were randomized into the intervention (*n* = 910) and control groups (*n* = 912). The control group consisted of usual care with general fall prevention measures. These measures included fall risk assessment, bed rails

Table 2.2

Appraisal of Evidence Table

Citation	Design/Level	Setting/Sample	Outcomes/Measurements	Findings	Grade
Ang, E., Mordiffi, S. Z., & Wong, H. B. (2011)	• Prospective Randomized Controlled Trial (RCT) • Level I	• Acute care hospital in Singapore • Convenience sample (*n* = 1822) • Control group (*n* = 912) • Intervention group (*n* = 910)	• Primary outcome: incidence of falls • Secondary outcomes: injury severity, time of falls, location of falls, patient activity at time of falls, type of falls • Hendrich II Falls Risk Model used to assess falls risk	• Intervention group: 4 falls 0.4%, 95% CI [0.2, 1.1] • Control group: 14 falls 1.5%, 95% CI [0.9, 2.6]. • The proportion of fallers was significantly lower in the intervention group than the control group (p = 0.018) • Injury severity: no injury control (64%) intervention (25%); small skin tear or laceration control (7%) intervention (50%); contusion control (29%) intervention (25%) • Time of falls: day shift control (36%) intervention (25%); evening shift control (28%) intervention (25%); night shift control (36%) intervention (50%) • Location of falls: at bedside intervention (100%) and control (57%) • Patient activity: attempting to get out of bed. intervention (50%) control (50%) • Types of falls: found on floor intervention group	A

				(50%) control group (29%) or fall from chair/commode/shower/ wheelchair intervention group (50%) control group (21%)	
Cameron, I. D., Gillespie, L. D., Robertson, M. C., Murray, G. R., Hill, K. D., Cumming, R. G., & Kerse, N. (2012)	• Systematic Review • Level I	• 60 RCTs (*n* = 60,345) • 43 trials in care facilities (*n* = 30,373) and 17 trials in hospitals (*n* = 29,972)	• Primary outcomes: rate of falls and number of fallers • Secondary outcomes: number of sustaining fall-related fractures, complications of the interventions, and economic outcomes.	• Hospitals: multifactorial interventions reduced the rate of falls RaR 0.69, 95% CI [0.49, 0.96] and risk of falling RR 0.71, 95% CI [0.46, 1.09], although evidence for risk of falling was inconclusive. • Care facilities: Vitamin D reduced the rate of falls RaR 0.63, 95% CI [0.46, 0.86], but not the risk of falling RR 0.99, 95% CI [0.90, 1.08]; physiotherapy did not significantly reduce rate of falls RaR 0.54, 95% CI [0.16, 1.81] but there was a significant reduction in the risk of falling RR 0.36, 95% CI [0.14, 0.93] • No complications of the interventions, such as sprains, strains, and adverse affects of vitamin D, were reported • No significant conclusions drawn regarding economic outcomes • No reduction in number of people sustaining a	A

				fracture in hospital multifactorial interventions RR 0.43, 95% CI [0.10, 1.78]	
Choi, Y., Lawler, E., Boenecke, C. A., Ponatoski, E. R., & Zimring, C. M. (2011)	• Quantitative systematic review • Level II	• RCTs, quasi-randomized controlled, controlled before-and-after, historically controlled, and cohort studies • Two-phase search strategy, first phase (*n* = 25) and second phase (*n* = 9)	• Primary outcomes: falls, fall-related injuries	• 12 out of 14 studies involving multifaceted fall interventions resulted in an important or sizable reduction in falls or fall-related injuries • Three distinct characteristics of interventions: physical environment, care process and culture, and technology-related interventions • Medication review: one retrospective before-and-after study determined medication review of 400 patients reduced falls by 47% • Bed rail reduction: one-year prospective before-and-after study (*n* = 1968) found a significant decrease in the number of serious fall-related injuries after a bedrail reduction policy was introduced (33 vs 18 serious injuries) • Bed alarm system: four month before-and-after study showed a reduction in the number of falls (78	A

				before vs 64 after) • Clinically significant evidence shows the efficacy of environment-related interventions in reducing falls and fall-related injuries	
Cox, J., Thomas-Hawkins, C., Pajarillo, E., DeGennaro, S., Cadmus, E., & Martinez, M. (2015)	• Descriptive, correlational, retrospective study • Level III	• 500-bed Magnet teaching hospital in northeastern New Jersey • Fallers (*n* = 50), nonfallers (*n* = 110)	• Primary outcomes: fall type, fall injury	• Majority of the falls (54%, *n* = 27) were considered to be anticipated physiologic falls, accidental falls comprised the second highest (28%, *n* = 14) • Age (*p* = 0.027), narcotic/sedative use (*p* = 0.001), and overnight shift (*p* = 0.00) significantly and independently predicted the likelihood of a fall. • Cardiovascular comorbidities (*p* = 0.001), neuro/musculoskeletal disease (*p* = 0.000), evening shift (*p* = 0.035), implementation of fall prevention strategies (*p* = 0.00), a higher RN-to-unlicensed assistive personnel staffing ratio (*p* = 0.001) were significantly and independently associated with a decreased likelihood of a fall.	A
Haines, T. P., Hill, A., Hill, K. D.,	• RCT • Level I	• Acute and subacute	• Primary outcome: fall rate	• 247 falls and 97 injurious falls total	A

McPhail, S., Oliver, D., Brauer, S., . . . Beer, C. (2011)		wards of Princess Alexandra Hospital, Brisbane, Australia, and the acute and subacute wards of Swan Districts Hospital, Perth, Australia • Control group (*n* = 381), materials only group (*n* = 424), complete program group (*n* = 401)	• Secondary outcome: injurious falls	• Rate of falls was significantly lower among participants with intact cognitive function in the complete program group (4.01 falls per 1000 patient-days) compared with the rate to participants in the control (8.72 falls per 1000 patient-days) and materials-only (8.18 falls per 1000 patient-days) • Trend in reduction in the rate of injurious falls among cognitively intact participants in the complete program group • Impaired cognitive function in complete program had a significantly higher rate of injurious falls per 1000 patient-days than in control group (7.49 vs 2.89)	
Hill, A., McPhail, S. M., Waldron, N., Etherton-Beer, C., Ingram, K., Flicker, L., . . . Haines, T. P. (2015)	• Pragmatic, stepped-wedge, cluster-RCT • Level I	• Eight rehabilitation units in general hospitals in Australia • Control period (*n* = 1983), intervention period (*n* = 1623)	• Primary outcomes: fall rate, proportion of fallers • Secondary outcome: injurious fall rate, length of stay	• No differences in length of stay, control period (median 10 days), and intervention period (median 11 days) • Less falls in the intervention group (*n* = 196, 7.80 per 1000 patient-days) compared to the control group (*n* = 380, 13.78 per 1000 patient-days) • Less injurious falls in the	A

				intervention group (*n* = 66, 2.63 per 1000 patient-days) compared the control group (*n* = 131, 4.75 per 1000 patient-days) • Less fallers during the intervention period (*n* = 136) than the control period (*n* = 248)	
National Guideline Clearinghouse (2012)	• Clinical Practice Guideline • Level IV	• 54 references	• Fall risk, fall rate, fall injury	• Main concepts: performing a risk assessment to identify risk factors, communicating risk factors, performing risk factor interventions, observing and surveillance, auditing, continuous learning and improvement	A
Spoelstra, S. L., Given, B. A., & Given, C. W. (2012)	• Integrative review • Level III	• Cochrane review, met-analysis and systematic review, clinical trials, case studies • 11 articles met inclusion criteria	• Primary outcome: patient falls	• Successful interventions in reducing hospital fall rates: developing a culture of safety, fall-risk assessments, multifactorial interventions, post-fall follow-up and quality improvement, and integration with electronic records • Fall risk assessment is consistently found within successful programs • Wide variations in fall reduction rates ranging from 19% to 57% or 1.91	B

				to 2.23 per 1,000 bed days	
Trombetti, A., Hars, M., Herrmann, F., Rizzoli, R., & Ferrari, S. (2013)	• Controlled study • Level II	• Geneva University Hospital in Switzerland • Sample size (n = 122), intervention group (n = 92), control group (n = 30)	• Primary outcomes: gait and balance performances, level of independence in ADL • Secondary outcomes: length of stay, incidence of in-hospital falls, hospital readmission, and mortality rates	• Intervention group compared to the usual care group had significant improvements in the TUG (p = 0.017), Tinetti tests (p < 0.001), the Functional Independence Measure (p = 0.027), and several gait parameters (p < 0.05) • Secondary outcomes were nonstatistically significant • Mean length of stay intervention group (38+/-21 days) control group (45+/-26 days) • In-hospital falls: 13% intervention group; 20% control group • Readmission: 15% intervention group; 23% control group • Mortality: 95% CI, [0.11, 0.85]; p = 0.02	A

raised, bed at lowest position, call bell within reach, green colored risk band, notification above bed, and education related to falls that consisted of instructing participants not to get out of bed without assistance and to how to use the call bell for assistance. The intervention group included usual care plus targeted multiple interventions based on individual risk factors and an education session lasting no more than 30 minutes on targeted multiple interventions according to risk factors (Ang et al., 2011). The purpose of this educational session was to increase the participants' awareness of their specific risk of falling and to provide strategies to reduce the specific risk.

Ang et al. (2011) stated there were a total of 18 high-risk participants who fell at least once during hospitalization, four participants from the intervention group 0.4%, 95% CI [0.2, 1.1] and 14 participants from the control group 1.5%, 95% CI [0.9, 2.6]. Compared to the control group, the proportion of participants who fell was significantly lower in the intervention group ($p = 0.018$). The use of the targeted multiple intervention strategy reduced the risk of falling to about 71% relative to the usual care interventions. The results concerning outcome, time, and type of falls are included in the Appraisal of Evidence Table 2.2. Ang et al. (2011) concluded that an individualized targeted multiple intervention strategy, in addition to usual care, is more effective than usual care alone in reducing patient falls.

Haines et al. (2011) conducted a three group RCT to evaluate the efficacy of two forms of multimedia patient education compared with usual care. The purpose was to further investigate if the education intervention was effective alone, without other interventions, and equally effective for patients with intact and impaired cognitive function. Participants were randomly assigned to one of three groups: the control group (usual care) ($n = 381$), the materials only group ($n = 424$), and the complete program group ($n = 401$).

The control group received no specific falls prevention education from the research team members (Haines et al., 2011). Usual care consisted of falls risk screening using risk alert items, such as arm bands, and generic interventions, such as a nursing checklist to prompt activities such as a regular toileting program and rounds of patients. There was additional one-to-one nursing for patients with acute agitation or confusion. Multidisciplinary support was provided on all wards.

Haines et al. (2011) tested two models of a patient education program. The complete program involved providing written and video-based materials and one-to-one follow up with a health professional trained to provide this program at the bedside. The program included presentation of frequency and outcomes of falls data, causes of falls, self-reflection of individual risk, problem area identification, development of preventive strategies, goal setting, and goal review. The video materials were viewed by patients using a portable digital video disc player and external head phones. The one-to-one follow up sessions were completed during the first week of patient participation in the study. The materials only group did not include the trained health professional follow-up, but involved providing the written and video-based materials. Both of these interventions were provided in addition to the usual care.

There were a total of 247 falls and 97 injurious falls in the study sample (Haines et al., 2011). The rate of falls was significantly lower among participants with intact cognitive function in the complete program group (4.01 falls per 1000 patient-days) compared with the rate to participants in the control (8.72 falls per 1000 patient-days) and materials-only (8.18 falls per 1000 patient-days) group. Falls were less frequent in the complete program group with cognitively intact patients (4.01 per 1000 patient-days) than the cognitively intact patients in the materials-only group (8.18 per 1000 patient-days) and control group (8.72 per 1000 patient-days). There was also a trend in reduction in the rate of injurious falls among cognitively intact participants in the complete program group. Participants with impaired cognitive function in the complete program group had a significantly higher rate of injurious falls per 1000 patient-days than participants in the control group (7.49 vs 2.89). However, Haines et al. (2011) stated there were no serious injuries, such as fractures, and the proportion of participants with impaired cognitive function who fell was comparable (complete program, 26%; control, 24%).

Hill et al. (2015) conducted a pragmatic, stepped-wedge, cluster-RCT in eight rehabilitation units in general hospitals in Australia. The purpose was to investigate the effectiveness of a fall prevention patient education program on fall rates with the addition of staff training and feedback to support the program. There was a control period (*n* = 1983) and an intervention period (*n* = 1623). Before the study began, the eight units were randomly assigned and hospital ward staff was informed of the allocation details at the start of the trial. After a 10 week control period, two units began the intervention period. During the control period, usual care was performed. The specific details of usual care were not mentioned, but the usual care did include fall prevention interventions. The intervention was the Safe Recovery Program, which consists of an individualized patient fall prevention education program. The purpose of this program is to alert patients about their personal risk of falls, increase their knowledge, and provide motivation. Educators provided this program and underwent six hours of online video conference-based training. The patient component of the program consisted of a multimedia education package, including a digital video disc, a written workbook, and individually tailored follow-up sessions from the educator. The educator helped the patients set personal goals to reduce risk of falls and to complete a written action plan. The staff component of the program included face-to-face staff training in the week of the start of the intervention on the unit. The educator also provided feedback to staff every week.

There were no differences in length of stay between the control period (median 10 days) and intervention period (median 11 days). Hill et al. (2015) stated that the overall rate of falls on the units was 10.9 falls per 1000 patient-days. There were fewer falls in the intervention group (*n* = 196, 7.80 per 1000 patient-days) compared to the control group (*n* = 380, 13.78 per 1000 patient-days). There were also less injurious falls in the intervention group (*n* = 66, 2.63 per 1000 patient-days) compared to the control group (*n* = 131, 4.75 per 1000 patient-days). There were fewer fallers during the intervention period (*n* = 136) than the control period (*n* = 248). Hill et al. (2015) concluded that individualized patient and staff education reduces falls and injurious falls.

Level II evidence. Trombetti et al. (2013) conducted a controlled intervention study to assess the effects of the program in improving gait and balance performances and the level of independence in activities of daily living (ADLs) as compared to usual care. The control group (*n* = 30) consisted of patients who were consecutively admitted to the hospital in a nondedicated unit and received standard usual care. The intervention group (*n* = 92) consisted of patients admitted to the dedicated unit and were consecutively enrolled into a multifactorial intervention program, in addition to the usual care.

Trombetti et al. (2013) stated that the multifactorial intervention program consisted of a multidisciplinary comprehensive assessment to address potential fall and fracture risk factors and an individually tailored intervention targeting each patient's individual risk factors and impairments. The physician assessment included the patient's medical history, history of falls during the last year, medications, cardiovascular status, neurological function, cognitive status, absolute fracture risk, bone health status, Vitamin D status, vision and visual acuity, vestibular function, and locomotor apparatus. The physiotherapist assessment included physical function, assistive devices, and footwear. The occupation therapist assessment consisted of fear of falling and environmental hazards. The dietitian assessment involved nutritional status and the nurse assessment included functional status. The social worker assessment included social environment. This program consisted of an intensive targeted rehabilitation therapy that was mostly based on exercise. The patients received weekly tests to monitor progress and update the rehabilitation plan. Some of these tests included electrocardiogram, orthostatic blood pressure measurement, mini-mental state examination, geriatric depression scale, blood tests, and the Timed Up and Go (TUG) test.

The control patients received usual care and were referred for evaluation to a specialized "falls consultation" available for all patients hospitalized in the institution, which consisted of a comprehensive assessment aimed to assess modifiable fall and fracture risk factors (Trombetti et al., 2013). These patients had gait analysis and functional tests done. The control patients also received the usual individually delivered physiotherapy.

Trombetti et al. (2013) determined that compared to the usual care group, the intervention group had significant improvements in the TUG ($p = 0.017$), Tinetti tests ($p < 0.001$), the Functional Independence Measure ($p = 0.027$), and several gait parameters ($p < 0.05$). Secondary outcomes of the intervention group, involving length of stay, falls, mortality, and hospital readmission outcomes, were nonstatistically significant compared with the control group (see Table 2.2). Trombetti et al. (2013) concluded that a multifactorial fall and fracture risk assessment and management program was effective and more beneficial than usual care.

Choi et al. (2011) conducted a systematic review that included the following study designs: RCTs, quasi-randomized controlled, controlled before-and-after, historically controlled, and cohort studies. The purpose consisted of three parts (a) to evaluate the effectiveness of interventions implemented through all relevant hospital domains on primary outcomes of interest, (b) to determine the characteristics of interventions that can facilitate the identification of the underlying mechanisms of interventions, and (c) to develop a hypothesis-generating multi-systematic model that establishes a practical framework (Choi et al., 2011).

A two-phase search strategy was performed and involved two different inclusion criteria, first phase ($n = 25$) and second phase ($n = 9$). In the first phase, the included studies tested an intervention aimed at reducing falls and fall-related injuries in the hospital and also reported the primary outcomes of falls and fall-related injuries (Choi et al., 2011). In the second phase, the included studies tested an environment-related intervention or factor with the purpose to reduce falls and fall-related injuries and also reported either primary outcomes or any associated outcomes (Choi et al., 2011).

Choi et al. (2011) identified that 12 out of 14 studies involving multifaceted fall interventions resulted in an important or sizable reduction in falls or fall-related injuries. Since it is difficult to determine which components of all the interventions contributed to a reduction in fall or fall-related injuries, an in-depth analysis of the characteristics of individual interventions was conducted. Choi et al. (2011) found that there is a wide range of individual interventions, but three distinct characteristics of interventions: the physical environment, the care process and culture, and technology-related interventions. One item of the care process and culture included medication review and modification. One retrospective before-and-after study determined that the medication review of 400 patients reduced falls by 47%. One example of environment-related interventions included bedrail reduction. A one-year prospective before-and-after study, involving 1968 patients, found a significant decrease in the number of serious fall-related injuries after a bedrail reduction policy was introduced (33 vs 18 serious injuries). Choi et al. (2011) stated that although bedrails have traditionally been recognized as a safety device, this study indicated that bedrails increase the severity of fall-related injuries. The bed alarm system is an example of a technology-related intervention (Choi et al., 2011). A four month before-and-after study in a 500-bed acute care hospital showed a reduction in the number of falls (78 before vs 64 after) when an advanced alarm system was used.

Choi et al. (2011) created two multi-systematic fall prevention models. The first model consists of these three distinct characteristics in preventing falls and injuries and includes extrinsic and intrinsic factors (Choi et al., 2011). The second model consists of the same characteristics and also includes the specific intervention and mechanism. Choi et al. (2011) concluded that there are several effective interventions that should be a part of the multifaceted fall prevention intervention that include: medication review modification, patient education, volunteer programs, and bedrail reduction programs.

Level III evidence. Spoelstra et al. (2012) conducted an integrative review consisting of the following designs: Cochrane review, met-analysis and systematic reviews, clinical trials, and case studies. The purpose was to identify findings from hospital fall prevention programs to provide a foundation for development of programs utilizing the best available evidence. The literature maintained wide variations in fall reduction rates ranging from 19% to 57% or 1.91 to 2.23 per 1,000 bed days. Spoelstra et al. (2012) stated that the studies that were successful in reducing hospital fall rates included some or all of the following: developing a culture of safety, fall-risk assessments, multifactorial interventions, postfall follow-up and quality improvement, and integration with electronic records. It was not clearly demonstrated which single intervention reduced falls; however, this review provided evidence of evidence-based multifactorial approaches to fall prevention. Fall-risk assessment is a consistent element within successful fall-risk programs. Post-fall follow-up with a reassessment, modification of risk level and intervention, and determination of the underlying problem reduced falls (Spoelstra et al., 2012). Conducting a safety huddle post-fall to discuss what occurred and problem solve was effective in reducing falls. Spoelstra et al. (2012) concluded that the overall keys to success were assessing and managing patients at risk for falls and implementing interventions to decrease falls based on the assessed risk.

Cox et al. (2015) conducted a descriptive, correlational, retrospective study. The purpose was to examine intrinsic, extrinsic, and workforce factors that contribute to patient falls (Cox et al., 2015). All adult patients who were admitted to the hospital and fell during their hospital stay were identified by the hospital's safety reporting system. These patients were ordered randomly and every third patient was systematically selected until 50 patients were chosen. Patients who were admitted and did not fall were ordered randomly and systematically selected until 110 patients were chosen. Cox et al. (2015) stated that the majority of the falls (54%, $n = 27$) were considered to be anticipated physiologic falls and accidental falls comprised the second highest (28%, $n = 14$). The majority of fallers sustained no injury (74%, $n = 39$). No patient sustained a serious or fatal injury. Cox et al. (2015) found that age ($p = 0.027$), narcotic/sedative use ($p = 0.001$), and overnight shift ($p = 0.00$) significantly and independently predicted the likelihood of a fall. Cardiovascular comorbidities ($p = 0.001$), neuro/musculoskeletal disease ($p = 0.000$), evening shift ($p = 0.035$), implementation of fall prevention strategies (*p* = 0.00), and a higher registered nurse (RN)-to-unlicensed assistive personnel (UAP) staffing ratio (*p* = 0.001) were significantly and independently associated with a decreased likelihood of a fall.

Cox et al. (2015) stated that although the results demonstrated that evening shift hours were found to significantly decrease the likelihood of a fall and night shift predicted the likelihood of a fall occurring, there is currently a lack of evidence in the literature regarding shift or time of day variations and fall likelihood. Patient factors such as age and use of narcotic/sedative use have been supported in varying degrees in the literature (Cox et al., 2015). Factors that were found to decrease the likelihood of a fall included cardiovascular disease and neurological/musculoskeletal disease, which did not coincide with previous findings and the literature supports comorbid disorders as risk factors for falls. Prior studies also support the outcome of a higher RN/UAP ratio to decrease likelihood of falls (Cox et al., 2015).

Level IV evidence. The NGC (2012) consists of an acute care protocol specifically on fall prevention. This protocol clearly states that the recommendations should be applied to hospitalized patients and the target population is adult patients in the acute care setting (NGC, 2012). The recommendations are supported by evidence. The findings from Ang et al. (2011) and Haines et al. (2011) are also included in this protocol and support the recommendations.

The main concepts of this protocol included: performing a risk assessment to identify risk factors, communicating risk factors, performing risk factor interventions, observation and surveillance, auditing, and continuous learning and improvement (NGC, 2012). The risk assessment consisted of testing for cognitive dysfunction, conducting an environmental safety assessment, identifying potential medication errors, and assessing gait and mobility function (NGC, 2012). Injury risk assessment was also necessary. Identifying risk factors leading to risk factor specific interventions should be performed and these factors included: age, bone, coagulation, and surgery (ABCs). Risk factors can be communicated through visual communication tools, patient and family education, and communicating patient falls risk to the whole health care team (NGC, 2012). Risk factor interventions included demonstrating environmental rounds, performing impaired mobility interventions, implementing behavioral interventions, and establishing universal falls interventions for all patients. Observation and surveillance consisted of hourly monitoring and reassessing patients for falls risk at shift change, if there was a change in clinical status, and after a fall (NGC, 2012). Finally, auditing, continuous learning and improvement involved creating an action plan for the future and performing safety huddles (NGC, 2012).

Construct EBP

Synthesis of literature. The majority of evidence supports multifactorial interventions (Ang et al., 2011; Cameron et al., 2012; Choi et al., 2011; NGC, 2012; Spoelstra et al., 2012; Trombetti et al., 2013). The evidence also demonstrates the need for a standardized assessment tool (Ang et al., 2011; Cox et al., 2015; NGC, 2012). Ang et al. (2011) evaluated the effectiveness of targeted multiple interventions, in which the interventions were linked to the risk factors from the Hendrich II Falls Risk Model. The NGC (2012) stated that there is currently no consensus as to any assessment instrument being better than others in fall prediction. There are multiple fall risk assessment instruments that have been developed and validated (NGC, 2012). These fall risk assessment instruments only predict falls and do not prevent falls from occurring (NGC, 2012). Patients who were at high risk for falls, using the Hendrich I fall scale, were 17% more likely to fall during hospitalization (Cox et al., 2015). Using a validated tool in determining a high fall risk score was a significant predictor of a fall during the hospitalization (Cox et al., 2015).

Assessment of gait and mobility function is also recommended (NGC, 2012; Trombetti et al., 2013). The NGC (2012) determined that successful fall reduction programs include a mobility test, such as the TUG test with fall risk assessment. Gait and balance disorders consistently are among the most frequent risk factors for falls. The effects of a multifactorial fall-and-fracture risk assessment program in improving gait and balance performance are assessed through instrumental gait analysis and functional tests, such as the TUG test (Trombetti et al., 2013). But, the essential assessment is gait and mobility function.

Injury risk assessment is also recommended in the literature (Cox et al., 2015; NGC, 2012; Trombetti et al., 2013). Trombetti et al. (2013) implemented a multidisciplinary systematic comprehensive assessment to address potential fall-and-fracture risk factors. Risk factors related to a patient's risk for injury include the ABCs (NGC, 2012). The age risk factor often includes patients who are 85 years old and older. The bone risk factor consists of osteoporosis, conditions that are risk factors for osteoporosis, or metastases to the bone. The risk factor of coagulation includes anticoagulation therapy or bleeding disorders. Major surgery is also a risk factor (NGC, 2012).

Education is mentioned as an intervention in all nine appraised sources. Both patient education and staff training/education are considered interventions in several articles (Cameron et al., 2012; Hill et al., 2015; NGC, 2012; Spoelstra et al., 2012). However, there were also sources that focused specifically on patient education (Ang et al., 2011; Choi et al., 2011; Haines et al., 2011; Trombetti et al., 2013). There is no consensus to what type or frequency of education is best practice. Ang et al. (2011) included an education session for patients that lasted no more than 30 minutes and discussed targeted multiple interventions according to the participant's risk factors. Patient education is a necessary component of multifactorial falls prevention programs and a successful method of education is the "teach back" process, which is a process that involves scripting (NGC, 2012). A multimedia or complete education program has also significantly reduced falls in individuals with no cognitive impairment (NGC, 2012). Haines et al. (2011) concluded that a complete program consisting of multimedia patient education program with trained health professional follow-up reduced falls among patients with intact cognitive function.

Hill et al. (2015) determined that individualized patient education programs combined with staff training and feedback reduced the fall rate and injurious fall rate in older patients. This program entailed the patient receiving a multimedia education package, consisting of a digital video disc and written workbook, and individually tailored follow-up sessions from the educator. The program was designed to be delivered in about 30 minutes across two to four sessions (Hill et al., 2015). The staff received training on information about the program and were also provided feedback every week about the goals the patient had set (Hill et al., 2015). Staff and patient and family education with provision of written materials reduced falls (Spoelstra et al., 2012).

Visual communication is also demonstrated through the evidence (Choi et al., 2011; NGC, 2012; Spoelstra et al., 2012). These visual identifiers include wristbands, room/door signs, chart identifiers, stickers, posters, and yellow or red nonskid slipper socks (Choi et al., 2011; NGC, 2012; Spoelstra et al., 2012). Post-fall follow-up is also recommended in the literature, which includes conducting a safety huddle to discuss what occurred, problem solve, and modify the plan of care (NGC, 2012; Spoelstra et al., 2012).

Best practice model recommendation. Based on the evidence from the literature review, it is recognized that multifactorial interventions that are specific to the patient are best practice. These multifactorial interventions include: a standardized assessment tool, assessment of gait and mobility function, injury risk assessment, patient education, staff training/education, visual communication, and post-fall follow-up. The NGC (2012) protocol provides clearly outlined interventions of best practice in fall reduction. Following this example, a structured fall prevention algorithm (see Appendix A) will be implemented for this EBP project and will include these best practice interventions. The nurses will be expected to follow the steps of the algorithm following an educational session on the use of the algorithm and fall prevention. The project leader will conduct a PowerPoint® presentation and will review the fall assessment, documentation, and necessary multifactorial interventions. Post-fall follow-up will include following the hospital's current procedure of documenting a paper Huddle form, significant event form, post-fall assessment form, and completing a VOICE report.

Answering the clinical question. This best practice recommendation of a fall prevention algorithm answered the clinical question by demonstrating the impact of these multifactorial interventions on fall rate, fall injury, and staff and patient compliance. The impact of this multifactorial approach was compared to usual care through data collection pre and post implementation of the best practice multifactorial interventions.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

Participants and Setting

The setting for this EBP project was an orthopedic/neurosurgical unit within a not-for-profit hospital, located in North Central Indiana. The unit consists of 32 beds with a high patient turnover rate. The participants included patients 18 years or older, who were admitted or transferred to the unit.

The project compared pre-implementation to post-implementation data. The pre-implementation data included falls data collected prior to the protocol initiation and the post-implementation data consisted of falls data collected after the protocol initiation. Data was collected from electronic health records (EHRs), post-fall assessment forms, Voice reports, and NDNQI data forms. The post-implementation data consisted of data from the beginning of project implementation (October 2016) to the end of completion (December 2016). The post-implementation data was compared to the pre-implementation data from the previous two years within the same time frame, October 2014 to December 2014 and October 2015 to December 2015.

Outcomes

There are four primary outcomes for this project: fall rate, injury rate, patient compliance, and staff compliance. Fall rate was measured with the number of falls per 1,000 patient days and injury rate was measured with the number of falls with injury per 1,000 patient days. The professional practice leader in the clinical education department tracks these data and the data are recorded through the NDNQI program.

Patient compliance was measured through the evaluation of the EHR, patient fall event report forms, VOICE reports, and NDNQI data forms (see Appendix B). The unit manager held possession of the paper patient fall event forms in her office. The VOICE reports were available through computer access with assistance from the unit manager. The professional practice leader in the clinical education department provided the project leader with the NDNQI data forms on a flash drive. The unit manager held possession of the flash drive in her office. The project leader measured patient compliance through randomized visual checks of the yellow wristband, yellow fall prevention sign outside the patient's room, yellow non-skid socks or adequate footwear, bed or chair alarms on, bed locked in low position, adequate lighting, no clutter and trip hazards, call light and personal items within reach, and the use of a gait belt and assisted walking device for ambulatory patients (see Appendix C). The project leader asked a question to validate knowledge of fall prevention education. The question was "What do you do when you need to go to the bathroom?"

Staff compliance was measured by the completion and documentation of the fall risk assessments every shift in the EHR. The components included: the Morse Fall Scale, injury risk assessment, mental status assessment, and medication review. Staff compliance was measured by completion of interventions including the documentation of fall risk IPOC care plans and order for PT/OT. If there was a patient fall, post-fall documentation and assessment was included in the evaluation of staff compliance (see Appendix D). A code sheet was utilized with the patient's medical record number matched with a code number that was assigned to each patient (see Appendix E).

Intervention

The best evidence regarding fall prevention in the hospital was integrated into a modified, up-to-date fall prevention protocol. According to the literature, multifactorial interventions specific to the patient are considered to be best practice (Ang et al., 2011; Cameron et al., 2012; Choi et al., 2011; NGC, 2012; Spoelstra et al., 2012; Trombetti et al., 2013). Every staff member on the unit was educated on the protocol prior to implementation. Staff members included: nurses, patient care providers (PCPs), one licensed practical nurse (LPN), the unit supervisor, and the unit manager. The project leader provided an education session at a mandatory meeting for the unit. Several days and times were available for day shift and night shift staff and it was mandatory to attend one meeting during the week. Staff members were educated on the updated falls prevention protocol, assessments, interventions, and documentation. The education session consisted of a PowerPoint® presentation and pre-test and post-test questions created by the project leader to assess learning (see Appendix F). A staff demographic form was completed (see Appendix G).

The nurses utilized the Fall Risk Algorithm (see Appendix A), which provided a stepwise approach to fall risk assessment and interventions. The algorithm was emailed to all staff on the unit and was posted on both sides of the nursing station, break room, meeting room, and near the medication dispensing system. The first part of the fall risk assessment included a standardized assessment tool, the Morse Fall Scale, which the institution currently uses. Since the literature does not identify a specific standardized assessment tool as best practice, the Morse Fall Scale continued to be utilized to predict falls. If the patient total score was 45 or greater, the patient was considered to be at risk for falls. The nurses completed a full medication assessment for every patient. The medication review was part of the fall/safety assessment form, which contained the Morse Fall Scale. This fall/safety assessment form was to be completed by the nurse every shift. The form demonstrated that a patient is considered at risk for a fall if the patient is on four or more medications, or taking high-risk medications, or has had recent changes to his/her medication regimen. The nurses completed a mental status assessment, which is currently utilized at the institution as part of the physical assessment documentation. The mental status assessment includes documentation of level of consciousness, orientation, cognitive status, memory, and behavior, mood, and/or affect. The injury risk assessment was also performed and consisted of assessing the patient for ABCs.

The next part of the algorithm displays that Universal Fall Precautions are to be followed for all patients. Universal Fall Precautions consist of orientating the patient to surroundings, adequate footwear or non-skid socks, adequate lighting, bed locked in low position, environment is free of clutter and trip hazards, call light and personal items within reach, and patient and family education. The algorithm also includes post-fall assessment and huddle. When a patient falls, the nurse completed the patient fall event report form that is currently utilized at the institution.

The algorithm demonstrated if there were one or more positive findings from the fall risk assessments, multifactorial interventions were initiated. These multifactorial interventions included visual interventions, which were observed by the project leader and behavioral interventions that the nurse implemented. Visual interventions comprised of safety tools, including a gait belt and assisted walking device. Visual communication was demonstrated through a yellow fall risk wristband, yellow fall prevention sign outside the patient's room, and yellow non-skid socks. Visual technology included bed and chair alarms. Behavioral interventions consisted of patient and family education, PT/OT order, documentation of IPOC care plan every shift, intentional rounding, and reassessment for fall risk every shift and/or with change in clinical status, and following a patient fall.

Planning

The implementation of the practice change and follow-up consisted of three months. Support from the agency was received. The unit manager contributed to the plan and encouraged staff through the practice change. This project consisted of three phases. The first phase was the pre-implementation phase and the project leader collected data prior to the implementation of the protocol. The implementation phase consisted of implementing the protocol. The post-implementation phase was the collection of data after the implementation of the protocol.

During the implementation phase, the nursing staff were educated on fall prevention and the Fall Risk Algorithm with an educational PowerPoint® during a staff meeting in October. After the meeting, the nurses began performing the fall risk assessments and interventions through the algorithm. The project leader was available to encourage and continue to educate staff on fall prevention. The project leader sent an email to staff reminding them to follow the protocol and document thoroughly. During the post-implementation phase, the project leader determined the outcomes of the implementation, including fall rate, fall injury, patient compliance, and staff compliance.

Data

Reliability and validity of data measures. The project leader collected data for this project through the Cerner EHR computer system at the institution. The outcomes measured for this project are supported by the literature. A data collection form was used to record all data, and these data were collected only by the project leader to increase reliability. Reliability was also a concern because staff compliance data was determined by the nurses' documentation. Reminding the staff to document data during implementation assisted with this concern. The fall rate and fall injury being reported consistently through the NDNQI, strengthens the validity of data collection.

Collection. Pre-implementation data was collected from the EHR from October 2014 to December 2014 and October 2015 to December 2015. These data was downloaded into an Excel spreadsheet and SPSS system for analysis. Post-implementation data was collected from October 2016 to December 2016. The outcome measures were compared to pre-implementation data. Staff and patient compliance data were compared through data collection forms created by the project leader.

Management and analysis. The project leader analyzed all collected data through SPSS 22, a computer program for statistical analysis. Descriptive statistics were utilized to show trends in compliance and demographic data. *T* tests were used to compare fall rates and injury rates pre and post-implementation.

Protection of Human Subjects

In order to ensure the protection of human subjects, the project proposal was submitted to the IRB of Valparaiso University and the institution. The project leader completed the National

Institutes of Health training and was certified to maintain ethical considerations regarding the protection of human participants (see Appendix H). Confidentiality was maintained by using de-identified data within a password protected computer.

CHAPTER 4

FINDINGS

The purpose of this EBP project was to implement a multifactorial approach to identify patients at risk for falls and provide individualized interventions necessary to prevent falls. The four primary outcomes included: fall rate, injury rate, patient compliance, and staff compliance. Fall and injury rate data were recorded through the NDNQI program. Patient compliance was measured through the evaluation of the EHR and VOICE report for each patient fall. There were randomized fall prevention visual checks and the project leader validated knowledge of fall prevention education. Staff compliance was measured by the completion and documentation of the fall risk assessments and the interventions every shift in the EHR. The staff members were also asked to provide their demographic data as well as fill out the pre-test prior to the educational session and then a post-test that followed.

Participants

Size

Patient compliance. The project leader performed randomized fall prevention visual checks on patients pre-implementation (*N* = 100) and patients post-implementation (*N* = 100) according to the fall prevention protocol.

Staff compliance. Staff members (*N* = 45) were educated on the fall prevention protocol prior to the fall prevention protocol implementation. These staff members consisted of 30 RNs, 1 LPN, and 14 PCPs.

Characteristics

Patient compliance. The patients of the visual checks consisted of 36% males and 64% females with a mean age 68.330 (*SD* = 14.486) pre-implementation and 29% males and 71% females with a mean age 62.110 (*SD* = 14.861) post-implementation (see Table 4.1). The patients were 63% orthopedic, 17% neurosurgical, and 20% medical/surgical pre-

Table 4.1

Characteristics of Visual Check Patients

	Pretest		Posttest		Total	Test
	n (%)	*M (SD)*	*n* (%)	*M (SD)*	*N* (%)	Statistic
Age		68.330 (14.486)		62.100 (14.861)		$t = 3.002$, $p = 0.003$
Fall medications number		3.898 (1.934)		3.313 (1.620)		$t = 2.301$, $p = 0.022$
Gender						$\chi^2 = 1.117$ $p = 0.291$
Male	36 (36)		29 (29)		65 (32.5)	
Female	64 (64)		71 (71)		135 (67.5)	
Surgery/diagnosis						$\chi^2 = 4.762$ $p = 0.092$
Orthopedic	63 (63)		60 (60)		123 (61.5)	
Neurosurgical	17 (17)		28 (28)		45 (22.5)	
Medical/surgical	20 (20)		12 (12)		32 (16)	
Opioids	72 (72)		87 (87)		159 (79.5)	$\chi^2 = 5.963$ $p = 0.015$
Anticoagulants	73 (73)		53 (53)		126 (63)	$\chi^2 = 9.381$ $p = 0.002$
Antihypertensives	54 (54)		26 (26)		80 (40)	$\chi^2 = 16.983$ $p = 0.000$
Anti-diabetics	22 (22)		27 (27)		49 (24.5)	$\chi^2 = 0.551$ $p = 0.458$
Mental status						$\chi^2 = 4.735$ $p = 0.030$
Alert & oriented	83 (83)		93 (93)		176 (88)	
Confused/ disoriented	17 (17)		7 (7)		24 (12)	

implementation. The patient diagnoses were 60% orthopedic, 28% neurosurgical, and 12% medical/surgical post-implementation. There were 83% alert and oriented and 17% confused or disoriented patients pre-implementation and 93% alert and oriented and 7% confused or disoriented post-implementation. While the characteristics of the patients were similar pre versus post-implementation, there were more adults who were older and on more medications in the pre-implementation phase. There were significantly less alert and oriented patients in the pre-implementation phase versus the post-implementation phase.

The number and type of fall medications that each patient received during the shift of the visual checks was tracked and recorded. During the pre-implementation shifts, there were 72% patients receiving opioids, 73% anticoagulants, 54% antihypertensives, 22% anti-diabetic medications. Post-implementation, there were 87% patients receiving opioids, 53% anticoagulants, 26% antihypertensives, and 27% anti-diabetic medications. There was a significant difference pre and post-implementation among the number of patients receiving opioids ($p = 0.015$), anticoagulants ($p = 0.002$), and antihypertensives ($p = 0.000$). However, there was no significant difference pre and post-implementation for anti-diabetics ($p = 0.458$). The mean number of fall medications per patient pre-implementation was 3.898 ($SD = 1.934$) and 3.313 ($SD = 1.620$) post-implementation (see Table 4.1).

Staff compliance. The nursing staff consisted of 30 (66.7%) RNs, 14 (31.1%) PCPs, and 1 (2.2%) LPN. The staff included 6.7% males and 93.3% females. The average age was 38.364 ($SD = 13.179$). The average time of employment on the unit was 4.541 ($SD = 7.439$) years. The staff consisted of 73.3% full-time, 15.6% part-time, and 8.9% PRN status. There were 46.7% nursing staff with a bachelors degree, 24.4% with an associate degree, and 26.7% with a high school degree (see Table 4.2).

Table 4.2

Characteristics of the Nursing Staff

	n (%)	*M (SD)*
Age		38.364 (13.179)
Years on unit		4.541 (7.439)
Gender		
Male	3 (6.7)	
Female	42 (93.3)	
Role		
RN	30 (66.7)	
PCP	14 (31.1)	
LPN	1 (2.2)	
Status		
Full-time	33 (73.3)	
Part-time	7 (15.6)	
PRN	4 (8.9)	
Degree		
Bachelor	21 (46.7)	
Associate	11 (24.4)	
High School	12 (26.7)	

Changes in Outcomes

Over the course of three months, this EBP project addressed the PICOT question and found that the impact of the multifactorial approach with best practice fall prevention interventions when compared to usual care demonstrated increased staff compliance through the visual checks and fall education documentation. While the rates increased, they did not improve significantly.

Statistical Testing

Patient compliance. A one-sample nonparametric test (chi-square goodness of fit) was chosen to compare the frequency of falls to other fall variables: injury, surgery or diagnosis, shift, mental status, and use of opioids (see Table 4.3). It was hypothesized that each value would occur with equal probabilities. A chi-square test of independence was completed to determine whether the fall variables were independent of each other. A fall variable was compared to the same fall variable occurring in the year of 2014, 2015, and 2016, during the months of October, November, and December. The independent-samples *t* test was used to compare fall rates and injury rates pre and post-implementation. An independent-samples *t* test was completed to compare the mean ages and the mean number of fall medications to the year.

Staff compliance. The nursing staff was given three pre-test questions and post-test questions preceding and following the educational session (see Appendix F). The project leader scored the questions out of a total of 10 points. The independent-samples *t* test was used to compare the mean scores of the pre and post-test groups. The chi-square test of independence was calculated to determine whether the components of the visual checks were independent from pre and post implementation (see Table 4.4).

Significance

Patient compliance. A one-sample nonparametric test (chi-square goodness of fit) was completed. It was hypothesized that each value would occur with equal probabilities. The chi-square goodness of fit test was calculated comparing the frequency of falls occurring with injury.

Table 4.3

Rates of Patient Compliance on Orthopedic/Neurosurgical Unit

	2014 (*n*)	2015 (*n*)	2016 (*n*)	Total (*N*)
Falls				
October	1	3	3	7
November	2	1	3	6
December	4	4	2	10
12 month total	17	39	22	78
Minor injury				
October	0	1	0	1
November	0	0	1	1
December	0	1	0	1
12 month total	2	2	5	9
Major injury				
October	0	0	0	0
November	0	0	1	1
December	0	0	0	0
12 month total	0	0	1	1
Surgery/diagnosis				
Orthopedic	2	3	5	10
Neurosurgical	0	5	2	7
Medical/surgical	5	0	1	6
Shift				
Day	2	5	7	14
Night	5	3	1	9
Mental status				
Alert & oriented	4	7	6	17
Confused	3	1	2	6
Opioids	3	6	6	15

Table 4.4

Staff Compliance: Visual Checks and Documentation

	Pre (*n*)	Post (*n*)	χ^2	*P*-value
Gait belt	81	100	20.994	0.000
Walking device	96	100	4.082	0.043
Wristband	74	80	1.016	0.313
Yellow sign	100	100		
Socks/footwear	92	94	0.307	0.579
Bed/chair alarm	63	71	1.447	0.229
Bed locked and low	99	100	1.005	0.316
Adequate lighting	100	100		
No clutter/hazards	100	100		
Call light and items in reach	98	100	2.020	0.155
Understanding validated	83	90	2.098	0.147
Morse Fall Scale and medication review	96	95	0.116	0.733
Injury risk	100	100		
Mental status assessment	94	92	0.307	0.579
PT/OT	89	87	0.189	0.663
IPOC care plan	47	37	2.053	0.152
Fall education	52	54	0.080	0.777
Fall interventions	77	65	3.497	0.061

Significant deviation from the hypothesized values was found ($\chi^2(1) = 9.783$, $p = 0.002$); injuries rarely occurred with falls. The chi-square goodness of fit test compared the frequency of falls occurring with orthopedic, neurosurgical, and medical/surgical patients. No significant deviation from the hypothesized values was found ($\chi^2(2) = 1.130$, $p = 0.568$); falls happened for all diagnoses. The test was calculated comparing the frequency of falls occurring on day and night shift. No significant deviation from the hypothesized values was found ($\chi^2(1) = 1.087$, $p = 0.297$); falls happened similarly on both shifts. The chi-square goodness of fit test was calculated comparing the frequency of falls occurring with alert and oriented patients and confused patients. Significant deviation from the hypothesized values was found ($\chi^2(1) = 5.261$, $p = 0.022$); more alert and oriented patients fell. The test was also used to compare the frequency of falls occurring with opioids. Significant deviation from the hypothesized values was found ($\chi^2(1) = 3.857$, $p = 0.050$); more patients on opioids fell.

A chi-square test of independence was calculated comparing fall with injury and the year. No significant relationship was found ($\chi^2(2) = 2.118$, $p = 0.347$). Fall with injury and the year of occurrence appear to be independent events. The test was also calculated to compare surgery or diagnosis of orthopedic, neurosurgical, and medical/surgical patients and the year. A significant interaction was found ($\chi^2(4) = 14.170$, $p = 0.007$). Patient surgery or diagnosis was related to the year of the falls.

The mean rate of falls was calculated for each year for the three months of October, November, and December. Independent-samples *t* tests were completed to compare the mean number of falls on the unit during these same three months for 2014, 2015, and 2016. The mean number of falls in 2014 ($M = 2.333$, $SD = 1.528$) was not significantly different from the mean number of falls in 2015 ($M = 2.667$, $SD = 1.528$) ($t(4) = -0.267$, $p = 0.802$). The mean number of falls in 2015 ($M = 2.667$, $SD = 1.528$) was not significantly different from the mean number of falls in 2016 ($M = 2.667$, $SD = 0.577$) ($t(4) = 0.000$, $p = 1.000$).

During October, November, and December, the total number of falls stayed the same from 2015 (*n* = 8) to 2016 (*n* = 8) with 2014 having the lowest total number (*n* = 7) (see Table 4.3). The total number of falls for the year in 2016 (*n* = 22) was less than 2015 (*n* = 39), with 2014 having the lowest number of falls (*n* = 17). There were also no minor or major injuries during the months of October, November, and December in 2014. There were minor injuries in 2015 (*n* = 2) and 2016 (*n* = 1). There were no major injuries in 2015 and one major injury in 2016. For the total year, there were minor injuries in 2014 (*n* = 2), 2015 (*n* = 2), and 2016 having the most (*n* = 5).

An independent-samples *t* test was completed to compare the mean ages during the years of 2014 and 2015. No significant difference was found ($t(13) = 0.087$, $p = 0.932$). The mean age of the patients who fell in 2014 ($M = 66.571$, $SD = 20.493$) was not significantly different from the mean age of the patients who fell in 2015 ($M = 65.750$, $SD = 16.228$). An independent-samples *t* test was also completed to compare the mean ages during the years of 2015 and 2016. No significant difference was found ($t(14) = -0.107$, $p = 0.916$). The mean age of the patients who fell in 2015 ($M = 65.750$, $SD = 16.228$) was not significantly different from the mean age of the patients who fell in 2016 ($M = 66.500$, $SD = 11.276$).

An independent-samples *t* test was completed to compare the mean number of fall medications during the years of 2014 and 2015. A significant difference was found ($t(11) = -2.565$, $p = 0.026$). The mean number of fall medications during the year of 2014 ($M = 2.000$, $SD = 0.632$) was significantly different from the mean during the year of 2015 ($M = 4.571$, $SD = 2.370$). There was no significant difference among the mean number of fall medications during the years of 2015 and 2016 ($t(13) = 1.446$, $p = 0.172$). The mean number of fall medications during the year of 2015 ($M = 4.571$, $SD = 2.370$) was not significantly different from the mean in 2016 ($M = 3.125$, $SD = 1.458$).

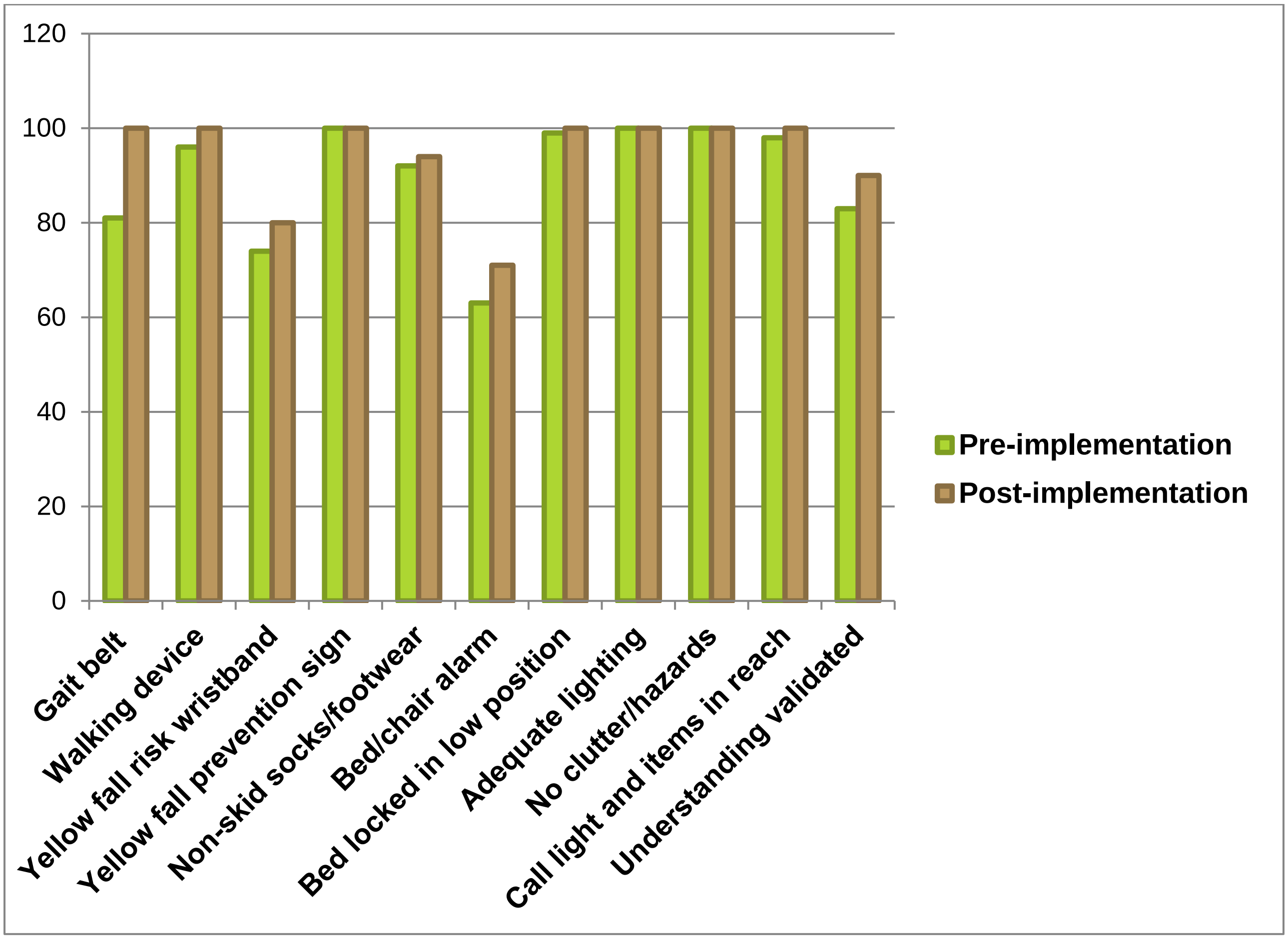
Staff compliance. An independent-samples *t* test comparing the mean scores of the pre and post-test groups found a significant difference between the means of the two groups for question one, ($t(80) = -3.501$, $p = 0.001$). The mean of the pre-test group was significantly lower ($M = 2.846$, $SD = 1.040$) than the mean of the post-test group ($M = 3.558$, $SD = 0.796$). There was a non-significant difference between the means of the pre and post-test groups for question two, ($t(88) = -1.483$, $p = 0.142$). The mean of the pre-test group ($M = 2.800$, $SD = 0.505$) was not significantly lower from the mean of the post-test group ($M = 2.933$, $SD = 0.330$). There was a significant difference between the means of the two groups for question three, ($t(76) = -2.577$, $p = 0.012$). The mean of the pre-test group was significantly lower ($M = 1.694$, $SD = 0.822$) than the mean of the post-test group ($M = 2.167$, $SD = 0.794$). A significant difference between the means of the total scores of the two groups was found ($t(88) = -4.403$, $p = 0.000$). The mean of the pre-test group was significantly lower ($M = 6.622$, $SD = 2.070$) than the mean of the post-test group ($M = 8.356$, $SD = 1.640$).

The chi-square test of independence demonstrated there were two significant components in the visual checks (see Figure 4.1). The gait belt presence in the patient's room was compared pre and post implementation and a significant relationship was found ($\chi^2(1) = 20.994$, $p = 0.000$); significant improvement from pre ($n = 81$) to post ($n = 100$) implementation was found. The presence of a walking device was also compared pre and post implementation and a significant relationship was found ($\chi^2(1) = 4.082$, $p = 0.043$); significant improvement from pre ($n = 96$) to post ($n = 100$) implementation was found.

Improvement was found from pre to post implementation for patient wristbands ($\chi^2(1) = 1.016$, $p = 0.313$), socks or footwear use ($\chi^2(1) = 0.307$, $p = 0.579$), bed or chair alarms ($\chi^2(1) = 1.447$, $p = 0.229$), bed locked in the low position ($\chi^2(1) = 1.005$, $p = 0.316$), call light and items within reach ($\chi^2(1) = 2.020$, $p = 0.155$). There was also an improvement in patient validation of understanding from pre to post implementation of the project leader's question regarding getting up to go to the bathroom ($\chi^2(1) = 2.098$, $p = 0.147$).

Figure 4.1

Visual Checks



There were components of the visual checks that remained consistent pre and post implementation. The yellow fall risk sign outside the patient door is available for use on every patient door of the unit, so every patient door had a sign during the visual checks. Adequate lighting and no clutter or hazards also remained consistent in which this was demonstrated for every patient pre and post implementation. Injury risk was a component that was also consistent. Every fall risk patient had a risk for injury, therefore every patient during the fall check-off maintained an injury risk identification.

Nursing documentation was also included with staff compliance. A slight improvement was demonstrated for fall education documentation from pre (n = 52) and post (n = 54) implementation ($\chi^2(1) = 0.080$, $p = 0.777$). There was no improvement in documentation of the Morse Fall Scale and medication review ($\chi^2(1) = 0.116$, $p = 0.733$), mental status assessment ($\chi^2(1) = 0.307$, $p = 0.579$), PT/OT orders ($\chi^2(1) = 0.189$, $p = 0.663$), IPOC care plans ($\chi^2(1) = 2.053$, $p = 0.152$), and fall interventions ($\chi^2(1) = 3.497$, $p = 0.061$). All rates for these documentations decreased pre to post implementation.

Staff turnover and patient days were considered to be factors in fall prevention. The orthopedic/neurosurgical unit had a 12.5% turnover in 2014, 8% in 2015, and 28% in 2016. However, 2016 had the highest staff turnover (28%) with less falls occurring for the total year (n = 22) than 2015 (n = 39), but more than 2014 (n = 17). The 2014 total unit patient days (n = 7,002) included October (n = 728), November (n = 548), and December (n = 602). The 2015 total unit patient days (n = 7,740) consisted of October (n = 687), November (n = 605), and December (n = 669). The 2016 total unit patient days (n = 7,669) included October (n = 655), November (n = 607), and December (n = 682). There were less falls for the total year (n = 17) in 2014 with the lowest total unit patient days (n = 7,002) (0.24%). The highest fall number occurred in 2015 (n = 39) with the highest total unit patient days (n = 7,740) (0.50%).

CHAPTER 5

DISCUSSION

This EBP project answered the PICOT question: In hospitalized patients on the orthopedic/neurosurgical unit (P), what is the impact of a multifactorial approach with best practice fall prevention interventions (I) when compared to usual care (C) on fall rate, fall injury, and staff and patient compliance (O) over the course of three months (T)?

Explanation of Findings

Patients

There were significant findings found for patient compliance. Frequency of falls occurring with alert and oriented patients and confused patients produced a significant deviation from the hypothesized values ($p = 0.022$); more alert and oriented patients fell. The evidence differs from the work of Haines et al. (2011) who found that the rate of falls was significantly lower among participants with intact cognitive function in the complete program group (4.01 falls per 1000 patient-days) compared with the rate to participants in the control (8.72 falls per 1000 patient-days) and materials-only (8.18 falls per 1000 patient-days). In this EBP project, it is possible that the alert and oriented patients who were also at fall risk were up and out of bed more frequently and decided to ambulate independently without asking for assistance and these actions resulted in an increase in falls.

A significant deviation was found ($p = 0.050$) when comparing frequency of falls occurring with opioids; more patients on opioids fell. Cox et al. (2015) conducted a descriptive, correlational, retrospective study that focused on patient factors. The author also found that the use of narcotic/sedative use was significant ($p = 0.001$) and independently predicted the likelihood of a fall. This EBP project had similar results in which the use of opioids compared with frequency of falls occurring was significant ($\chi^2(1) = 3.857$, $p = 0.050$).

The frequency of falls occurring with orthopedic, neurosurgical, and medical/surgical patients was examined. No significant deviation from the hypothesized values was found ($\chi^2(2) = 1.130$, $p = 0.568$); falls happened for all diagnoses. Cox et al. (2015) found that there was a significantly less likelihood of a fall for patients with cardiovascular comorbidities ($p = 0.001$) and neuro/musculoskeletal disease ($p = 0.000$). Cox et al. (2015) concluded that these results did not coincide with previous findings and the literature supports comorbid disorders as risk factors for falls.

The mean fall number during the October, November, and December months of 2014 and 2015 ($p = 0.802$) and 2015 and 2016 ($p = 1.000$) showed no significant difference. The number of falls did not decrease significantly after the intervention. This finding was not consistent with the literature. Ang et al. (2011) found that the proportion of fallers was significantly lower in the intervention group than the control group ($p = 0.018$). Hill et al. (2015) also found less falls in the intervention group ($n = 196$, 7.80 per 1000 patient-days) compared to the control group ($n = 380$, 13.78 per 1000 patient-days).

There were no minor or major injuries during the months of October, November, and December in 2014. In 2015, there were minor injuries ($n = 2$) and no major injuries. In 2016, there was one minor injury and one major injury in 2016. The frequency of falls occurring with injury was examined. Significant deviation from the hypothesized values was found ($\chi^2(1) = 9.783$, $p = 0.002$); injuries rarely occurred with falls. Hill et al. (2015) found that there were less injurious falls in the intervention group ($n = 66$, 2.63 per 1000 patient-days) compared to the control group ($n = 131$, 4.75 per 1000 patient-days). Injury occurrence in this EBP project pre and post implementation would be better demonstrated with a larger sample size. Although the implementation period was shorter for three months, there were few minor injuries and one major injury demonstrated.

Staff

There were also significant findings related to staff compliance. The nursing staff received pre and post-test questions after the educational session. There was a significant difference between the means of the two groups for question one (p = 0.001) and for question three (p = 0.012). There was no significant difference between the groups for question two (p = 0.142), which was unexpected. This question states to list three or more interventions to prevent falls. Some of the staff members did not list at least three. Others also wrote fall components that were not interventions listed on the fall risk algorithm. This could account for the lack of significant difference.

Hill et al. (2015) conducted a study that included staff training, education, and feedback to support the patient fall prevention education program. Hill et al. (2015) found fewer falls in the intervention group (n = 196, 7.80 per 1000 patient-days, p = 0.003) compared to the control group (n = 380, 13.78 per 1000 patient-days). Fewer injurious falls were demonstrated in the intervention group (n = 66, 2.63 per 1000 patient-days, p = 0.006) compared the control group (n = 131, 4.75 per 1000 patient-days). This EBP project also included staff education and patient education. The fall and injury rate results were not consistent with this study because the sample size of patients pre (n = 100) and post (n = 100) implementation was not large. However, the staff did demonstrate significant improvement in two of the pre and post-test questions. Future implications could include a larger sample size of patients and intervention and control groups.

The visual checks consisted of significant results when comparing the items to pre and post implementation. The gait belt in the patient's room (p = 0.000) and the presence of a walking device (p = 0.043) had a significant relationship between pre and post implementation. There was improvement from pre to post implementation for patient wristbands (p = 0.313), socks or footwear use (p = 0.579), bed or chair alarms (p = 0.229), bed locked in the low position (p = 0.316), call light and items within reach (p = 0.155), and patient validation of understanding (p = 0.147).

The visual checks consisted of multifactorial interventions. The data shows that there was consistency among three interventions and improvement in the eight other interventions. Evidence shows that multifactorial interventions decrease fall and fall injury rate. Choi et al. (2011) conducted a systematic review and stated that 12 out of 14 studies with multifaceted interventions had resulted in an important or sizable reduction in fall or fall-related injuries. Cameron et al. (2012) also conducted a systematic review and concluded multifactorial interventions reduced the rate of falls RaR 0.69, 95% CI [0.49, 0.96] and risk of falling RR 0.71, 95% CI [0.46, 1.09], although evidence for risk of falling was inconclusive. The results of this EBP project are not consistent with a sizable reduction in fall or fall-related injuries. This may be related to the short implementation period of three months and smaller sample size of patients (n = 100).

Staff compliance also included documentation. There was only improvement demonstrated with fall education documentation (p = 0.777). There was no improvement in documentation of the Morse Fall Scale and medication review (p = 0.733), mental status assessment (p = 0.579), PT/OT orders (p = 0.663), IPOC care plans (p = 0.152), and fall interventions (p = 0.061). These findings were unexpected. The project leader expected there to be improvements in all components of documentation. Some nurses consistently did not document on specific items. The project leader did recognize several nurses not documenting in certain areas consistently and therefore, educated them on the correct documentation.

The evidence did not specifically focus on documentation as a primary measure. However, Choi et al. (2011) found that one retrospective before-and-after study determined medication review of 400 patients reduced falls by 47%. The NGC (2012) also recommends auditing, continuous learning and improvement for staff. Spoelstra et al. (2012) concludes that integrating fall prevention interventions with electronic record documentation is a successful intervention in reducing hospital fall rates.

Evaluation of Applicability of Theoretical and EBP Frameworks

Theoretical Framework

Orlando's Nursing Process Discipline was applicable to this EBP project. This theory can be applied to patients who exhibit behavior that is related to fall risk. Orlando's nursing process includes three elements: the behavior of the patient, the reaction of the nurse, and the nursing actions designed for the patient's benefit (Orlando, 1990). A patient who is at risk for falls often displays many emotions and is often in distress and demonstrates verbal and nonverbal behaviors. Patients may refuse to call for assistance before ambulating and question why they cannot get out of bed independently. The next element is the reaction of the nurse. The nurse assesses the patient's behavior and then shares the reaction. If the nurse notices that the patient is continuing to get out of bed and the bed alarm goes off, the nurse shares the reaction with the patient through questioning and expressing concern for why the patient continues to not call for assistance. Then, the process leads to the nurse's action, which is to educate the patient on fall prevention. According to the results, there was an improvement in fall education from pre (n = 52) and post (n = 54) implementation.

One strength of Orlando's Nursing Process Discipline is that this theory guides nurses through interactions with patients and confirms that patients have input in their care. Patients have individualized fall interventions. It is necessary for the nurse to explore the reaction with the patient, therefore, inaccurate diagnoses and ineffective interventions are prevented. The process of meeting the patient's need is broad and can be demonstrated by nurses in various practice settings. This is a strength because this project can be potentially implemented throughout the hospital.

One limitation is that this theory focuses on the interaction with the individual and not others, such as the family members. Many times, family members need to be included in the plan of care especially when patients are not oriented and confused or who decide to not comply with fall prevention education. Another limitation is that only one patient need is considered at a time and often times there is more than one immediate patient need. Another limitation is that this theory is for patients who are able to communicate and the nurse asks the individual about the behavior expressed, if the patient cannot communicate his or her needs, then the nurse cannot verify the behavior expressed. In this project, there were patients who were confused and may not have been able to communicate their needs, therefore the behavior could not be verified.

EBP Framework

The Iowa Model of Evidence-Based Practice was applicable to this EBP project because it translates research findings into clinical practice through structured steps. This framework helps organize practice change by providing a step-by-step process on how to implement change (Brown, 2014). A problem-focused trigger was first identified and for this project, patient fall rate was first identified and was determined to be a priority for the unit. The project leader formed a team consisting of nursing staff, unit manager, unit supervisor, project advisor, and education department leader. This team helped develop, evaluate, and implement the change. The PICOT question was created and a literature search was conducted. Evidence was appraised and it was determined that there was sufficient evidence to implement a change. The project was submitted for IRB approval, which was the implementation into a pilot practice change step. Then, it was determined that the change was appropriate. The implementation of the project was evaluated, and the outcome data were analyzed.

One strength of the Iowa Model is that this model is easy to understand and is used in many health care organizations (Brown, 2014). Specific steps were provided. Another strength is that this model concentrates on the problem by problem-focused triggers. The Iowa Model also focuses on the evidence appraisal and determining if a practice change is achievable. One weakness is that this framework does not provide a method for data collection methods and a list of appraisal tools and steps can further improve this model.

There were several modifications made during the implementation of the project. This addressed the needed changes in relation to the guiding framework. The project leader originally was going to include the Mini-Mental Status Examination in the assessment portion of the algorithm because evidence has shown that this has been utilized. However, the Mini-Mental Status Examination would be time consuming for the nurses to complete and the EHR did not include the specific components of the exam. Therefore, the Mini-Mental Status Examination was not utilized for this project. Instead, the mental status assessment was added to the algorithm, which is part of the nurses' physical assessment in the EHR. This includes level of consciousness, orientation, cognitive status, memory, and behavior, mood, and affect. This was a more efficient alternative to measure mental status.

The TUG test was also originally in the assessment portion of the algorithm because evidence demonstrates that the TUG test is utilized to assess gait and mobility function. The project leader met with the physical therapists on the unit to discuss the TUG test. The physical therapists explained that they sometimes perform the TUG test, but not on every patient because it is often difficult to do this test on postoperative orthopedic patients because the test is timed and these patients often move slower right after surgery. This test is at times performed by the physical therapists if the patient is a medical patient. Since most of the patients on the unit were orthopedic patients, the TUG test was not used in the protocol. The Morse Fall Scale includes an assessment of the patient's gait, with options of normal, weak, or impaired. Therefore, this was utilized to assess gait instead of the TUG test.

Another modification during the implementation phase of the project was that the project leader was going to do the staff education during the monthly staff meeting; however, not all staff members go to the meeting. So, the project leader decided to offer three educational sessions during day and night shift times. The nursing staff were also informed that attending one meeting was mandatory, which allowed the project leader to educate every staff member. Another addition was to include patient characteristics along with the visual check-off list, so more data would be available to the project leader. The patient characteristics included: age, gender, surgery or diagnosis, fall risk medications, and mental status.

If the EBP project was repeated, these modifications mentioned above would be implemented. Another modification would be to extend the time period of the implementation from three months to six months, which may produce more significant results. Another modification that could also be included would be for the project leader to sit down with each nurse and review the documentation on fall prevention. While collecting data on the staff compliance of documentation, the project leader noticed continuous errors or incomplete documentation for specific nurses. The project leader then notified the specific nurses of the correct documentation. The project leader had reviewed the documentation during the educational session and in emails sent to the staff. However, if the project leader is face-to-face with the nurse and documentation is reviewed, there may be an increase in staff compliance regarding documentation.

Strengths and Limitations of the EBP Project

Strengths

There were several factors that impacted this project. Support from the hospital system was a strength. The professional practice leader in the clinical education department assisted with data collection from NDNQI, which provided necessary fall data. The unit manager was available for questions and assisted with access to VOICE. The manager had ordered more gait belts, so there was an increased supply on the floor. Therefore, this may have helped with visual check results for gait belt in the patients' room. Another strength was that the nursing staff was willing to participate in the education sessions. All nursing staff was present for an educational session except for several PCPs who worked PRN and were in nursing school.

Limitations

One limitation was that the staff pre-test and post-test questions and demographic forms were not matched. Therefore, data analysis was limited. The project leader also did not have access to the paper huddle forms, which may have included more data on the patient falls. There also may have been more significant results if the implementation time period was extended to six months instead of three months. Another limitation was that there were several recently hired nursing staff who may not be familiar with fall prevention assessment and intervention as some of the experienced nurses who have worked on the unit longer. A limitation was that the project leader was unable to collect data on non-fall risk patients because all patients were considered to be fall risk patients because they were receiving fall risk medications.

Implications for the Future

Practice

Implications for practice include the nursing staff continuing to demonstrate the multifactorial approach to fall prevention. The fall risk algorithm will be continued to be used on the unit and will be implemented on the other units in the hospital system. The other units in the hospital system can benefit from the multifactorial approach. The total inpatient falls in the hospital system for 2016, excluding pediatric, obstetrics, labor and delivery, and outpatient units, consists of 190 falls with 39 minor injuries, one moderate injury, and three major injuries. The orthopedic/neurosurgical unit in 2016 accounted for 22 falls, five minor injuries, and one major injury. The current fall policy will also be updated and will include evidence that is best practice. New staff members will be educated on the algorithm and the fall protocol.

The project leader was limited on collecting data on the patients who fell because of nurse documentation. It was difficult to determine from the documentation if a bed or chair alarm was being used at the time of fall. Currently, the hospital system utilizes VOICE to document on the patient fall. There is a scrolled list of safety precautions to be checked and can easily be not documented. Bed alarm was listed on the scrolled list; however, chair alarm was not listed. Implications for practice should include having a mandatory yes/no answer on VOICE to say if either a bed or chair alarm was on at the time of fall because this is important data to be aware of and determines if staff are being compliant with this intervention.

Implications for practice also include organized and efficient documentation. At the educational sessions, several nurses mentioned how the fall documentation is repetitive and there are many forms to be filled out in different locations. The current hospital procedure after a fall is to document a paper Huddle form, significant event form, post-fall assessment form, and complete a VOICE report. The hospital system could limit the documentation to a VOICE report and one post-fall form. This post-fall form will include the post-fall assessment and information from the huddle paper and the significant event note. Implications for practice can also include if a patient falls, it should automatically present an alert that he or she had a fall while in the hospital, so every health care professional is aware when they open the chart in the EHR.

Theory

The findings from this EBP project influence future theory development by promoting fall prevention. Health and safety are foundations of theory development and are demonstrated in this project. The fall risk algorithm also provides a structured model to be followed. Orlando's Nursing Process Discipline was an appropriate theory to be utilized for this project. Future theories can model after Orlando's theory and focus on basic elements specific to a fall risk situation, including assessments and interventions involved. The immediate need for a fall prevention intervention can be demonstrated by fall risk factors that are identified during assessment.

Research

Implications for research include more evidence that focuses on best practice and the multifactorial approach. There is a need for more RCTs to be conducted to strengthen the evidence in the hospital setting. Further research can identify best practice fall risk assessment tools. There is a need for more clinical practice guidelines that focus on fall prevention. The details of best practice protocols and algorithms need to be established in the literature. Researchers should focus on the aspects of specific interventions such as, the use of technology sensors in the bed and chair (Cameron et al., 2012). There is not sufficient evidence on the use of technology and fall prevention. The manager on the orthopedic/neurosurgical unit has discussed getting alarms for the toilets in the patient bathrooms in the future. However, the project leader did not find evidence specifically discussing alarms in the bathroom.

There should also be research that focuses specifically on cognitively impaired patients and interventions and the assessment process. Cameron et al. (2012) stated that future researchers should not exclude cognitively impaired individuals from trials and should examine the level of cognitive impairment and indicate whether the degree of impairment is an effect modifier. Research can focus on educational interventions that can be implemented with cognitively impaired patients compared to cognitively intact patients. Future research can focus on staff compliance with fall prevention, including monitoring documentation on post-fall assessments, education, and interventions. Cox et al. (2015) suggested that future research examine fall risk factors that are modifiable, such as environmental factors, and compare factors that are non-modifiable, such as patient comorbidities. Further research can evaluate staffing ratios and compare night to day shift outcomes. There also needs to be more evidence on the use of sitters and fall prevention. Sitters are listed as an intervention on the current hospital fall policy; however, there is not sufficient evidence that this should be a part of the multifactorial approach.

Education

There is a need for increased education on patient falls and assessment. Evidence has demonstrated several types of patient and staff education interventions. Future implications can focus on a complete education program for patients, which was demonstrated in the study conducted by Haines et al. (2011). Patients will not only receive written materials on fall prevention, but will receive video-based materials regarding fall prevention and one-to-one follow up. Future implications for education can include using the “teach back” process method and scripting (NGC, 2012). This process was presented in this EBP project to the nursing staff during the educational session. Patients and families need to receive education on causes of falls, problem area identification, goal setting, and development of preventive strategies and behaviors (Haines et al., 2011). Face-to-face staff training is also an approach to education that can be demonstrated.

Implications for education include educating the staff on fall risk medications. During the visual checks, the project leader rounded on non-fall risk patients, however because they were on fall risk medications, they were considered to be fall risk. Currently, the fall safety assessment form consists of the Morse Fall Scale and the medication review. The medication review specifies, “Consider putting patient at risk for a fall if patient is on four or more medications, or taking high-risk medications, or has had recent changes to their medication regimen.” There is also an option to view list of high-risk medications. The nurses were reminded of this during the educational session, however this needs to be further addressed because during the visual checks, the project leader noted that the patients who the nursing staff considered non-fall risk were receiving fall risk medications. The data also shows that more falls occurred with patients taking opioids.

Conclusion

This EBP project addressed the PICOT question and the four primary outcomes including: fall rate, injury rate, patient compliance, and staff compliance. There was improved staff compliance through fall education documentation, pre and post-test questions, and the visual checks for the algorithm. There was no significant improvement in patient compliance. There were no significant differences among the fall rate and injury rate throughout October, November, and December and the years of 2014, 2015, and 2016.

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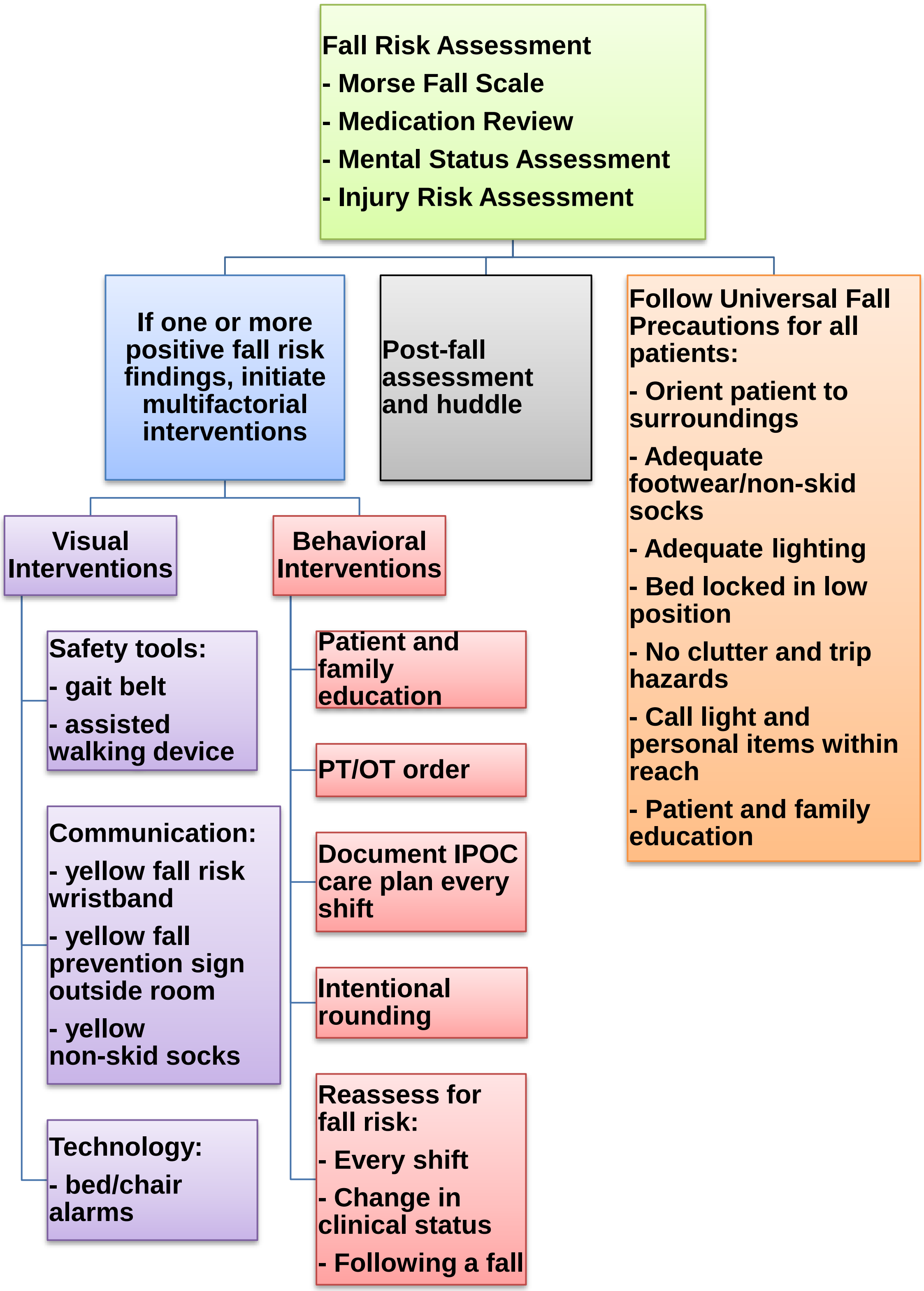
Appendix A

Fall Risk Algorithm



Appendix B

Patient Compliance Data Collection Form for the EHR

Date and Time of Fall	Age	Gender	Diagnosis/Surgery	Location of Fall	Assisted or Unassisted	Type of Fall	Fall with Injury (specify type)	Nonskid Slippers on	Call Light Utilized	Patient Behavior (confused, impulsive, etc.)

Appendix C

Visual Check Off List

Patient Room #	Gait belt	Assisted walking device	Yellow fall risk wristband	Yellow fall prevention sign outside door	Yellow non-skid socks/adequate footwear	Bed alarm/ chair alarm on	Bed locked in low position	Adequate lighting	No clutter and trip hazards	Call light and personal items within reach	Validate understanding with patient
Ortho South											
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5566											
5567											
5568											
5569											
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Appendix D

Staff Compliance Data Collection Form for the EHR

Patient Code Number																			
Morse Fall Scale	**Y**																		
	N																		
Injury Risk Assessment	**Y**																		
	N																		
Mental Status Assessment	**Y**																		
	N																		
Medication Review	**Y**																		
	N																		
PT/OT Order	**Y**																		
	N																		
IPOC Care Plan	**Y**																		
	N																		
Post-fall Documentation and Assessment	**Y**																		
	N																		

Appendix E

Code Sheet

Medical Record Number	Code Number
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	50

Appendix F

Staff Pre-test/Post-test Questions

1. What are the key components of a fall risk assessment?

2. List three or more interventions to prevent falls.

3. What do you do after a patient falls?

Appendix G

Staff Demographic Form

Please circle your response below each question or specify response in line provided.

1. What is your gender?

    Male   Female

2. What is your age?

    Please specify____________

3. What is your role?

    RN   PCP   Other (please specify)____________

4. What is your current employment status?

    Full-time   Part-time   PRN

5. How long have you worked on this unit?

    Please specify____________

6. . What is the highest degree or level of education you have completed?

    High School   Associate's degree   Bachelor's degree   Master's degree

    Doctoral degree

    Other (please specify)____________

BIOGRAPHICAL MATERIAL

Laura graduated from Saint Mary's College of Notre Dame, Indiana in 2012 with a Bachelor of Science in Nursing (BSN) degree. For the past four years, Laura has worked on an orthopedic/neurosurgical unit as a staff and charge nurse, and preceptor. Her passion for nursing led her to pursue a Doctor of Nursing Practice (DNP) degree at Valparaiso University. She will complete her DNP degree in May 2017. Laura is a member of Sigma Theta Tau International Honor Society of Nursing (STTI) and American Association of Nurse Practitioners (AANP). During her time working on the orthopedic/neurosurgical unit, she recognized the significance of fall and injury prevention. She strongly desired to become a leader and reduce the fall rate and injury through her EBP project. Laura plans to continue to work with the hospital fall committee and further develop the current fall prevention policy.

ACRONYM LIST

ABCs: Age, bone, coagulation, and surgery

AHRQ: Agency for Healthcare Research and Quality

CMS: Centers for Medicare and Medicaid Services

EBP: Evidence-based practice

EHR: Electronic health record

NDNQI: National Database of Nursing Quality Indicators

NGC: National Guideline Clearinghouse

RCT: Randomized controlled trial

TUG: Timed Up and Go test