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## Hospital to Home: Fall Prevention Interventions for the Discharging Patient

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Hospital to Home: Fall Prevention Interventions for the Discharging Patient

A Scholarly Inquiry Paper

Joy Bridewell

Winona State University

### Abstract

Falls is a major public health problem globally, with an estimated 646,000 fatal falls per year. This makes falls the second leading cause of unintentional injury death. Falls are very costly with non-fatal fall injuries costing about \$50 billion per year and fatal falls with an estimated \$754 million. Many risks factors contribute to a person's risk for falling. Risk factors include age, gender, muscle strength, underlying medical or disabling conditions, and unsafe environments. Patients who have been hospitalized are also among those at risk. Most hospitalized patients are assessed frequently to determine their risk of falling so that care plans can be adjusted to implement strategies to avoid a fall. However, nurses frequently discharge patients with little to no education or tools to prevent falls at home. The purpose of this scholarly inquiry project is to explore the best practices for fall prevention after discharging home from the hospital. An extensive integrative literature review highlighted evidence that supports and arms patients, families, and support systems with tools that will help prevent a fall at home after being discharged from the hospital. A conceptual map details the interventions that need to be integrated at discharge to help create a home fall prevention plan of care. Three themes emerged from the literature and include criteria for implementing falls risk discharge interventions, fall risk discharge interventions, and the outcomes from the interventions. Recommendations for nursing are also built into this project that can guide nurses in protecting patients by implementing evidence-base strategies to prevent patients from falling at home after discharge and decrease the risk of reoccurring hospitalizations or fall fatality.

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## Introduction

### Introduction

A fall is defined by the World Health Organization (2018) as “an event that results in a person coming to rest inadvertently on the floor or other lower level.” Falls is a major public health problem. The World Health Organization (2018) report, “an estimated 391,000 people globally died due to a fall in 2002, making it the 2<sup>nd</sup> leading cause of unintentional injury death globally.” In addition, falls can also be very costly. According to the Centers for Disease Control and Prevention (CDC) (2019) non-fatal fall injuries cost about \$50 billion per year and costs of fatal falls are estimated at \$754 million. Many risk factors place a person at risk for falling. Those risk factors can be nonmodifiable such as age, gender, underlying medical or disabling conditions. The World Health Organization (2018) reports higher incidents of mortality in female adults over age 70. Risk factors can also be modifiable such as a muscle strength and unsafe environments. Patients who have been hospitalized are also among those at risk. Patients, especially those that are categorized as “high risk” for falling in the hospital setting, are too often discharged home without any preparation for preventing falls in the home setting. Prevention strategies should place emphasis on education, training, creating safer environments, prioritizing falls related research, and establishing policies that are effective in reducing the risk of falls (WHO, 2018). These strategies can be put into practice to decrease the number of falls. But what is the most recent evidence-based practices that can be implemented to decrease the number of falls in the home setting after being discharged from the hospital? This question is what fueled the development of this Scholarly Inquiry Project.

## **Background and Rationale**

Nurses in a hospital setting assess patients at least daily using a standardized fall assessment tool to determine the risk factors that could contribute to falling. Once a fall assessment is complete, the nurse creates a plan of care for patients that meet the criteria for being a falls risk. The plan of care consists of several interventions along with referrals to create an interprofessional team that collaborates to prevent patients from falling while hospitalized. Once the nurse receives orders to discharge the high-risk-for-falls patient, little to no education or interventions are typically included in the discharge plan. The rationale for this project is to prepare nurses to protect discharged patients from falling at home thus leading to the increased possibility of injury and/or hospital readmission.

## **Purpose**

The intent of this Scholarly Inquiry Project is to identify interventions supported by strong evidence in the literature to prevent falls of the post-hospitalized patient who was also considered a falls risk while in the hospital.

According to Mahoney et al. (2000) the incidence of falls substantially increases in the first month after hospitalization, especially in patients greater than 65 years old. Mahoney et al., 2000 also reports that falls are a major cause of injury and morbidity. Knowing the potential fall risk that each patient is leaving with when they leave the hospital is a call for action for nurses to better prepare their patients for discharge.

An additional intent for this Scholarly Inquiry Project is to amplify the role of the registered nurse (RN) as a collaborator/coordinator of care for the patient. Collaboration

according to Cresia & Friberg (2011) is “a multifaceted process of working together to accomplish a common goal,” (p 77). Collaborative and coordination of care efforts might be between the nurse and physicians, therapists (OT, PT, etc.), dietitians, etc. to provide a continuum of care that benefits the health and wellbeing of the patient. The common goal is to prevent post-hospitalized falls of a discharging, fall-risk patient. One of the Nursing Codes of Ethics according to the American Nurses Association (2015) is that nurses commit to advancing health, welfare, and safety. The nurse commits to the safety of the patient by informing the patient of his or her risk of falling along with education and strategies for fall prevention. Lee, Brown, Stolwyk, O’Connor, & Haines (2016) completed a study that researched factors that predisposed a person to falls after discharging from a hospital. In that study, 42% of those patients could not recall discussing falls prior to discharging. In collaboration with several health professionals, along with the patient and his or her support systems, education and discharge preparation strategies will need to be implemented to prevent post-hospitalized falls.

Providing high-quality care places emphasis on the importance of gathering and critically appraising the literature to identify the best practice interventions for post-hospitalized fall prevention. The intent is to go beyond the walls of an acute-care setting and into the homes of patients so that we can continue to provide high-quality care that protects and enhances the quality of their lives.

### **Clinical Nursing Question**

The PICO(t) process was used to define the problem further. The population, intervention, comparison and outcomes were defined. The population is adults age 60 and over



who are high fall risk patients preparing for discharge to their home or personal residence; the intervention will be discharge education strategies, and instructions for fall prevention; comparison will be no discharge education on the prevention of falls post-hospitalization and the outcome will be a reduction in falls at least one month post-hospitalization. The research PICO(t) question is: In older adult patients 60 years and older who are hospitalized, are a high risk for falls, and are preparing for discharge, what are the best discharge strategies, including but not limited to education, tools, interventions and instructions, to prevent a post-hospitalized fall versus no identified discharge strategies?

### **Method Used for the Inquiry**

To research the clinical nursing question, an integrative literature review was completed. An integrative literature review according to Melnyk & Fineout-Overholt (2015) is a “review that provides information about existing evidence related to study questions by reviewing similar studies that address a specific clinical question using a detailed, comprehensive search strategy and rigorous appraisal methods for the purpose of summarizing, appraising, and communicating the results and implications of all the research available on a clinical question” (p. 125). The method used allowed the author to dive into the appraisal of studies using tools to help minimize bias. The Iowa Model of Evidence-Based Practice was utilized in guiding the decision-making process when critiquing studies. Melnyk & Fineout-Overholt (2015) states that “the Iowa Model provides a guide in decision making about clinical and administrative practices that affect the outcomes of patients”. Grove, Burns, & Gray, (2013) state that “the Iowa Model of Evidence-Based Practice guides the development of an evidence-based project in a clinical healthcare

agency”, (p. 496). Along with the framework of the Iowa Model a descriptive study checklist for rapid critical appraisal by Melnyk & Fineout-Overholt (2015) was also used. The level of evidence helps to determine the validity, reliability, and applicability of the study. Melnyk & Fineout-Overholt (2015) discuss general critical appraisal questions that scrutinize each study to determine its validity, reliability, and applicability. These tools allowed for a rigorous approach to each study in the hopes of minimizing bias. An integrative review allowed for a synthesis of all evidence to develop a recommendation of best practices.

## **Literature Review**

### **Introduction**

Once the clinical nursing question was developed, there was a need for evidence to determine if a change in practice was needed. The literature review included all current (within the last 5 years) evidence that supported a need for collaboration on fall prevention. The literature review revealed key concepts of prevention interventions for high fall risk patients who are discharging home from a hospital setting. Refer to Appendix A for a thorough appraisal of the literature.

### **Search Strategy**

The literature search was conducted in December 2019, with the use of several databases including: Google Scholar, Ovid, CINAHL Complete, Cochrane Library, and ProQuest Dissertation & Theses Global: The Humanities and Social Sciences Collection. Publications of studies were limited to the years of 2014 through 2019. Several comprehensive search terms were utilized to retrieve the body of evidence. Those terms included high fall risk, fall risk, fall

prevention, discharge education or discharge instructions or discharge teaching, and adults, or adult, or elderly (see also Appendix B). All articles focused on a population greater than sixty years old with a fall history, or were considered a medium to high fall risk. Articles were not excluded if able to translate to English. The writer assessed both abstracts and full text articles utilizing the Darrell W. Krueger Library databases at Winona State University. Literature was then whittled down based on the certain criteria that included an intervention for education on or a decrease in post-hospitalized falls with evidence to support the findings. Articles related to pediatric population or patient being discharged to a rehab or TCU unit rather than their home were excluded. All global studies were included, not just within the United States.

### **Themes of Literature Review**

After the literature was reviewed, several themes emerged (see Appendix C). Those themes consist of the criteria for implementing falls risk discharge interventions, the falls risk discharge interventions, and the outcomes from the interventions. It also became evident that a fourth theme emerged within the literature, this being the role of the nurse.

### **Criteria for Implementing Interventions**

Three criteria emerged that helps nurses identify those who may need an intervention to prevent falls at home after discharge. The first was if discharging patient was over the age of 60-years-old. Every study met this criterion. The second was if the discharging patient scored a medium to high fall risk at the time of discharge. Unfortunately, only five studies reported this information to the reader. The final criterion for the intervention was if the patient had a history of falls. Six studies reported a history of falls.

## **Interventions**

Authors exposed several interventions within the studies that were reviewed. Those interventions include: written education, multimedia education, face to face education, patient centered education, inclusion of support systems, mobility and or exercise education, home follow-ups, home modifications, medication and nutrition modifications.

**Patient Centered Education.** Patient centered education was a theme that arose in the literature most often. Naseri et al. (2019) implemented tailored education and interventions based on the needs of the patient. Emphasized areas included ADL assistance, home modifications, and exercise. Ueda et al. (2017) incorporated the tailored approach as well in using home floor plans to assist in fall prevention. Patient centered education is a broad term that describes the various approach to educating a patient about their falls risk before going home. Three sub-themes also arose from patient centered education. They are written education, multimedia education, and face-to-face education.

**Written education.** Written education was an intervention used by Hill et al. (2019), Kamei, et al. (2014) & Lee, Pritchard, McDermott, & Haines (2014). Hill et al. (2019) provided education within a fall prevention workbook for the patient allowing the patient to familiarize themselves with risks and prevention on falls. Kamei et al. (2014) provided written mock-up models of a typical home depicting fall risk factors within the home. Lee et al. (2014) provided fall prevention education interventions including a written format used to provide information on fall prevention.

**Multimedia education.** Another intervention was the use of multimedia education. Multimedia education included education via digital video, power points, digital downloads, etc. All three of the above studies provided several multimedia approaches included in the above written intervention. Lee et al. (2014) provided fall prevention via the preference of the patient. Hill et al. (2019) provided education via digital video on falls and fall prevention. Kamei et al. (2014) provided a two-hour program with diagrams and videos on fall risks including nutrition, foot care, exercise and demonstrates practices that increased home safety. Cerilo, (2016) also educated patient via videos on the importance of preventing the risks of falling.

**Face-to-face education.** Face-to-face intervention was incorporated in the above studies including Hill et al. (2019) Kamei et al. (2014) and Lee et al. (2014). These studies placed emphasis on the importance of face-to-face education as an intervention in educating on fall prevention to patients preparing to discharge home. Face-to-face education was found to have a stronger effect on patients by placing a large emphasis on functional decline from being hospitalized. This type of interventions was felt to show the patient that fall prevention is a high priority at the time of discharge.

**Mobility training/exercise.** Several studies incorporated mobility training or exercise as an intervention prior to discharging home. Chu et al.(2016) implemented home OT visits after discharging from the hospital up to the first 6 months after discharging home. Ciance (2014) completes a Falls Efficacy Scale (FES) with patients prior to discharging. The FES focuses on balance and exercise. The score from the FES determines the patients need for increased education on fall prevention and post-discharge follow-up phone calls. Hayes (2017)

implemented both balance and strength training as a fall risk intervention. The training decreases the risk of falling, but also improves the fear of falling. Hopewell et al. (2018) interventions included exercise among other interventions to prevent falls. Kamei et al. (2014) implemented change in everyone's homes, implementing home safety awareness by implementing a home hazard modification program (HHMP) as an intervention for each patient. Kamei et al. (2014) also included multiple exercise sessions within its regimen of interventions on fall prevention. Liu-Ambrose et al. (2019) interventions for fall prevention included strengthening, balance and other exercises in a home-based exercise program. These were taught by a physical therapist. Matchar et al. (2017) intervention on exercise incorporated PT to focus on training in strength, gait, and balance. PT worked with patients for three months. Potter, Pion, Kliinkerberg, Kuhrik, & Kuhrik (2014) promoted mobility training and building mobility skills for in the home. Sherrington et al. (2014) intervention included experienced physiotherapists completing home visits with the patients. Education was a 20-30-minute program on lower limb balance, weight bearing and strengthening exercises. These sessions were completed six days a week. Van Ancum et al. (2018) study wanted to address a link between muscle mass and falls. The intervention included strength training for fall prevention in male patients only.

**Home follow-up visits.** Home follow up visits was an intervention by Barker et al. (2019) who incorporated a home risk assessment to promote prevention of home fall risks. Bernocchi et al. (2018) implemented a tele-rehab/home based program that provided medial/nursing surveillance by retrieving a weekly status on symptoms and providing support to

the patient. Hopewell et al. (2018) implemented social visits after discharging. The social visits were implemented to measure and document adherence to the discharge plan. Kamei et al. (2014) incorporated practicing home safety techniques and assessing home modifications after discharging. Barker et al. (2019) implemented interventions and strategies that comprised of several components including a home-based risk assessment, 6 months of education via phone calls, and referrals to services that they might need such as PT/OT. Sherrington et al. (2014) incorporated home follow up visits to complete strength training and to assess logbook for tracking exercise.

**Inclusion of support systems.** Education that included support systems was only present in one of the studies. Potter et al. (2014) not only implemented fall prevention skills training to the patients, but also to the family caregivers as well. Both Kamei et al. (2014) and Ueda et al. (2017) implemented home modifications that placed awareness on home safety by assisting in creating safe floor plans to prevent falls.

**Medication/nutrition.** Bischoff-Ferrari et al. (2016) studied the implementation of different doses of vitamin D with relation to falls. Chien & Guo's (2014) study that showed a correlation of nutrition with a higher risk of falling.

## **Outcomes**

The interventions determined different outcome within the studies reviewed. The outcomes were that there was no change in fall rates after the intervention or that the intervention showed a reduction in fall rates. Bischoff-Ferrari et al. (2016) Hill et al. (2019), & Naseri et al. (2019) studies determined no change in fall rates. Bischoff-Ferrari et al. (2016) study

determined that increasing Vitamin D from 24000 IU to 60000 IU or adding calcifediol to a patient's medication regimen showed no decrease in the risk of falling for the patient. Hill et al. (2019) study determined no significant differences in fall rates from the intervention group to the control group after implementing individualized fall prevention education utilizing workbooks, digital video, face to face education goal orientated discharge plans and a monthly phone call for the first three months after discharge. Naseri et al (2019) utilized interventions that included tailored education to increase engagement in fall prevention strategies showed no increase within six months of discharging from the hospital. All of the other 18 studies showed that the interventions which included written, multimedia, and face to face education with the patient, mobility and or exercise training including collaboration with PT and OT, implementation in home follow-ups via nurse visit or phone calls, patient centered interventions, inclusive education with the patient and their support systems, home modifications, and nutritional status all showed a reduction in fall rates.

Table.

<u>Citation</u>	<u>Summary of the Intervention</u>	<u>Noted difference in post-discharge fall rates</u>	<u>Significant?</u>
Barker et al. (2019)	Telephone-based patient centered program	Decrease in falls per year	Significant p=0.042
Bernocchi et al. (2018)	Tele-rehab home-based program	Decrease in falls in 6 months	Significant p<0.001
Bischoff-Ferrari et al. (2016)	increasing Vitamin D from 24000 IU to 60000 IU or adding calcifediol to a patient's medication regimen	No decrease in fall rates after 1 year	Not significant
Cerilo, 2016	fall risk awareness in fall prevention showed a significant difference (p<0.05).	fall risk awareness in fall prevention increased	Significant p<0.05



Chien & Guo (2014)	Nutrition as a fall predictor in older adults	Poor nutrition places older adults at a higher risk of falling	Significant p<0.001
Chu et al. (2016)	OT fall reduction home visit program	Number of fallers after one year	Significant p=0.03
Ciance (2014)	Educate to enhance knowledge of fall prevention in elderly	Follow up scale not significant, however no falls reported	Not significant
Hayes (2017)	Strength exercises and balance training on reducing the fear of falling	Showed effectiveness in improving geriatric populations fear of falling	significant
Hill et al. (2019)	implementing individualized fall prevention education utilizing workbooks, digital video, face to face education goal orientated discharge plans and a monthly phone call for the first 3 months after discharge.	No decrease in fall rates	Not significant (adjusted IRR, 1.09; 95% CI [0.78 to 1.52])
Hopewell et al. (2018)	Exercise, social visits, environment adjustments, med reviews	May reduce falls compared to no interventions	RR 0.87, 95% CI 0.74 to 1.03
Kamei et al. (2014)	Education on fall risk factors, nutrition, foot care, exercise , home safety	Improves awareness of fall prevention and modifies behaviors	Significant p=0.05
Lee et al. (2014)	Face to face education, written, and interpersonal contact	Effective in reducing fall rates after discharge	Significant- RR 0.77, 95% CI (0.69 to 0.87)
Liu-Ambrose et al. (2019)	Education with follow-up, home programs with PT(exercise, balance and strengthening)	Effective in reduction in falls	Significant p=0.009
Luz, Bush, & Shen, (2017)	Education, exercise, device acceptance and use	Effective in acknowledgement and acceptance in the use of devices to decrease falls.	Significant p<0.05
Matchar et al. (2017)	PT to fall prevention education	Effective in decreasing falls	Significant p=0.002
Naseri et al (2019)	tailored education to increase engagement in fall prevention strategies	No decrease in fall rates	Not significant
Potter et al. (2014)	Mobility training	Improvement in fall risk awareness and mobility skills	Significant
Sherrington et al. (2014)	Wt. bearing exercises	Improvement in mobility,	Significant p=0.004

Ueda et al. (2017)	Tailored education and home floor plans	Improvement in falls	Hazard ratio 0.25; 95% CI (0.09 to 0.75)
Van Ancum et al. (2018)	Strength training	Lower muscle mass associated with post-hospitalized falls	Significant Hand Grip Strength, Skeletal Muscle Mass and Skeletal Muscle mass Index (ORs, 95% CI respectively: 0.93, 0.88-0.99, 0.80, 0.71-0.92 and 0.50, 0.33-0.76)
Webster et al. (2019)	OT power points, engagement, handouts on home safety assessments/home modifications	Increase in knowledge of fall prevention risk factors	Significant Overall knowledge increased by 32%.

### **The Role of the Nurse**

The role of the nurse is that of a collaborator. Delivering healthcare can be very challenging. Collaborative efforts are needed to help strengthen the delivery of healthcare. Goldsberry (2018) states that “interprofessional collaboration is now being recognized as an essential piece in the improvement of healthcare delivery,” (p. 1). To improve delivery of healthcare in the discharge process for a patient that is a high fall risk the nurse must collaborate with other professionals to provide the best outcome for the patient after discharging. Maughan (2016) states that “nurses are key players in care coordination, particularly when transitioning patients from one area to another, including the community”, (para. 1). The nurse is responsible for collaborative efforts in the transition of a patient to his or her home, ensuring all efforts are made and plan is in place for a smooth and successful transition.

### **Strengths of the Literature**

The strength of the literature is evident in the amount of studies that fall into Level I and Level II (see Table 1). There was one Level I article, eleven Level II articles, three Level II, one Level IV, one Level V, three Level VI, and no Level VII articles. With 12 of the 20 articles

rated Level I or Level II, higher levels of evidence strengthen the recommendations in this project.

*Table 1.*

**Level of Evidence**

<b>Type/level of evidence</b> Adapted from Ackley, Swan, Ladwig, & Tucker (2008)	<b>Number of articles within the scholarly inquiry</b>	<b>Article citation</b>
<b>Level I:</b> Evidence from a systematic review or meta-analysis of all relevant RCTs or evidence-based clinical practice guidelines based on systematic reviews of RCTs or three or more RCTs of good quality that have similar results.	1	Lee et al. (2014),
<b>Level II:</b> Evidence obtained from at least one large (multi-site) well-designed RCT (randomized controlled trial).	11	Baker et al. (2019), Bernocchi et al. (2018), Bischoff-Ferrari et al. (2016), Chu et al. (2016), Hill et al. (2019), Hopewell et al. (2018), Liu-Ambrose et al. (2019), Matchar et al. (2017), Naseri et al. (2019), Potter et al. (2014), Sherrington et al. (2014), Ueda et al. (2017)
<b>Level III:</b> Evidence obtained from well-designed controlled trials without randomization (i.e. quasi-experimental).	3	Cerilo (2016), Ciance (2014), Kamei et al. (2014)
<b>Level IV:</b> Evidence from well-designed case-control or cohort studies.	1	Van Ancum et al. (2018)
<b>Level V:</b> Evidence from systematic reviews of descriptive and qualitative studies.	1	Hayes (2017),
<b>Level VI:</b> Evidence from a single descriptive or qualitative study.	3	Chien et al. (2014), Luz et al. (2017), Webster et al. (2019)
<b>Level VII:</b> Evidence from the opinion of authorities and/or reports of expert committees.	0	

*Levels of Evidence*

**Type/Levels of Evidence**

**Level I:** Evidence from a systematic review or meta-analysis of all relevant RCTs or evidence-based clinical practice guidelines based on systematic reviews of RCTs or three or more RCTs of good quality that have similar results.

**Level II:** Evidence obtained from at least one large (multi-site) well-designed RCT (randomized controlled trial).

**Level III:** Evidence obtained from well-designed controlled trials without randomization (i.e. quasi-experimental).

**Level IV:** Evidence from well-designed case-control or cohort studies.

**Level V:** Evidence from systematic reviews of descriptive and qualitative studies.

**Level VI:** Evidence from a single descriptive or qualitative study.

**Level VII:** Evidence from the opinion of authorities and/or reports of expert committees.

These ratings of the level of effectiveness are based on the following:

Ackley, B. J., Swan, B. A., Ladwig, G., & Tucker, S. (2008). *Evidence-based nursing care guidelines: Medical-surgical interventions*. St. Louis, MO: Mosby Elsevier.

Other Levels of evidence ratings may be used, but a key with the type (and citation) of the specific rating must appear with the table (at the beginning, as a key is most helpful)

## **Gaps in Literature**

After completing the integrative literature review several notable gaps became evident. Several of the literature did not elaborate on the extent of topics during discharge education teaching. Some literature discussed discharge education on fall prevention including “usual care” but did not elaborate on what usual care consisted of. Areas that were noted to be under-explored were studies that involved a support network for elderly patients. Elaborating on what the support network consisted of would allow for better inclusion of those key individuals in discharge education and collaboration. Several studies within the literature discussed collaboration with health care workers, but not many involve education for support systems including, family, friends, relatives, etc.

## **Summary**

The literature reviewed within this scholarly inquiry project provided strong evidence to support interventions that prevent fall risk patients from falling after being discharged from the hospital. The strongest evidence in the post-hospitalized fall prevention for adults who are over the age of sixty and have a risk of falling described a collaborative effort by multiple healthcare professionals to include mobility, strength, and exercise programs along with implementation of face to face, written, and multimedia discharge education on home fall prevention risks and strategies.

## **Conclusion, Nursing Implications and Recommendations**

## **Introduction**

This scholarly inquiry project sifted through the literature to find the best evidence that would support an intervention to prevent post hospitalized patients from falling at home.

Discharging from the hospital, with the amount of information being given about a diagnosis, follow-up appointments, medication, etc., can be an overwhelming time for patients and families.

## **Conclusions**

A person who is at risk for falls is one who is vulnerable to increased susceptibility to falling, which may cause physical harm, compromised health, and possible hospital readmission (Ackley, Ludwig, & Flynn-Makic, 2017). The role of the nurse is to implement interventions to prevent such harm. These project recommendations empower nurses to collaborate with other healthcare professionals in maintaining the safety of fall risk patients as they discharge home.

## **Nursing Implications**

The literature in this project describe key strategies nursing can implement based on the “needs, preferences, and capabilities of patients” who are at-risk for falling post-hospitalization (WHO, 2007,p.23). Assessment of the patient and his or her home environment is an important step in determining the needs of the patient prior to discharge. After assessing, the nurse creates a plan of care that consists of interventions needing to be completed by the nurse. Those interventions require the nurse to collaborate with several other healthcare professionals. The Code of Ethics for nurses’ states, “Ethics, human rights, and nursing converge as a formidable instrument for social justice and health diplomacy that can be amplified by collaboration with other health professionals” (American Nurses Association, 2015). Collaboration is an important

step in preparing a patient for home. The body of evidence within the literature highlights the need for nurses to collaborate with other entities including PT, OT, dietitians, pharmacists, and the education department along with the patients support system in order to continue to provide patients with the education and strategies to prevent post hospitalized falls. Once collaboration occurs, the nurse will need to educate, provide strategies, and create goals to keep his or her patient safe and free from falls. After teaching and creating goals, the nurse will need to follow up with the patient to promote the teaching that occurred at discharge and to assess the outcomes of the implemented goals.

### **Recommendations**

Figure 1 represented by the concept map, reflects the recommendations from the literature. The following is a list of implemented interventions that were among the body of evidence within the literature. RNs should use these interventions when a patient is 60 years or older, was scored medium to high falls risk while hospitalized, or has a history of falls.

#### Patient centered education

- Foot care, including caring for feet, assessing each foot daily, assessment of proper fitting shoes, the use of shoes in the home versus socks (Kamei et al., 2014)
- Yearly visual screening to assess vision to decrease a chance of vision playing a role in a patient falling at home. (Matchar et al., 2017)
- Assess comorbidities, greater than two comorbidities, implement tailored fall program. Tailored fall program consists of intense PT that focuses on strength training, gait and balance for a total of 3 months. (Matchar et al., 2017)

- Engaged discussion about fall prevention (Webster et al., 2019)

#### Written education

- Provide a guide book on preventing falls (Ciance, 2014; Hill et al., 2019; Lee et al., 2014 & Webster et al., 2019) The guide book would provide education for the patient and support system. It will include risks and preventive measures to decrease incidences of falls.

#### Face to face education

- Face to face

All education whether it is with a nurse, therapists, pharmacist, etc. will be provided face to face. It will not be handed off for others to complete or only in another form of education (booklet, pamphlet, etc.) (Hill et al., 2019; Kamei et al., 2014; Lee et al., 2014 & Webster et al., 2019)

#### Multimedia education

- Fall prevention video that discusses fall prevention interventions and implementations to prevent the patient from falls. It also discusses risks that increase the risk for falls (Cerilo, 2016; Hill et al., 2019; Lee et al., 2014)
- OT power point educate on strategies to assist with daily living that decrease the chance of a patient incurring a fall at home after discharge. (Webster et al., 2019)

#### Medication modifications/review

- Vitamin D at 24 000IU (Bischoff-Ferrari et al., 2016)

- Review of current medications for fall risk (high fall risk medication alerts) (Ciance, 2014; Hopewell et al., 2018)
- Polypharmacy (Matchar et al., 2017)

#### Nutrition status

- Collaboration with dietitian prior to discharge (Chien & Guo, 2014)
- Nutrition education, education on a healthy diet to decrease or maintain a healthy BMI (Kamei et al., 2014)

#### Home follow up visits

- 6-month- telephone-based follow-up (education, coaching, goal setting)(Barker et al., 2019 & Bernocchi et al., 2018)
- 1-year telephone-based follow-up with survey (Ciance, 2014)
- Monthly telephone-based follow-up for reinforcement/modification of home plan (Hill et al., 2019)
- Social visits (Hopewell et al., 2018)

#### Home modifications

- Environment changes (Hopewell et al., 2018)
- Importance of mobility devices (Luz et al., 2017)
- Environmental hazards (Matchar et al., 2017)
- Tailored home floor plans (Ueda et al., 2017)
- Home safety assessment and modification tools (Webster et al., 2019)

#### Exercise/Mobility training



- Home program with exercises on strength, balance, and walking (Bernocchi et al., 2018; Ciance, 2014; Hayes, 2017; Hopewell et al., 2018; Kamei et al., 2014; Liu-Ambrose et al., 2019; Matchar et al., 2017)
- Home OT visits post discharge and at 6 months (Chu et al., 2016)
- Mobility training (Potter et al., 2014)
- Weight bearing exercises (Sherrington et al., 2014)
- Strength training for male patients (Van Ancum et al., 2018)

#### Inclusion of support system

- Family education (Cerilo, 2016)

The evidence from the integrated literature review revealed success in decreasing post hospitalized falls by implementing a fall prevention plan of care consisting of a variety of interventions. To determine the best interventions to decrease post-hospitalized falls, nurses should work with their interprofessional team to determine the best strategies due to the patient's needs, preferences, and capabilities.

### **Conceptual Framework**

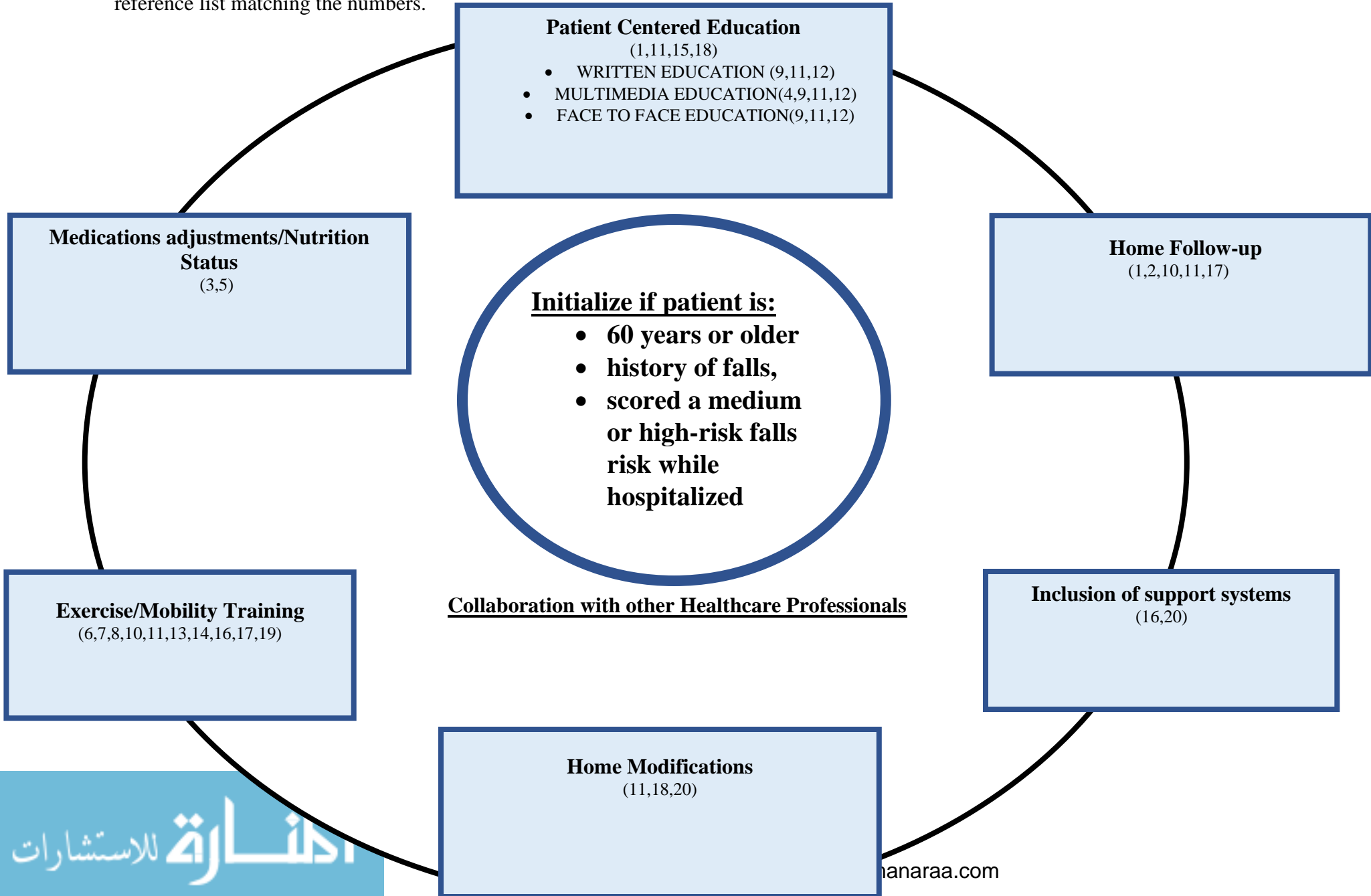
#### **Conceptual Map**

The literature revealed many interventions to support the post-hospitalization fall prevention for a hospitalized fall risk patient. A theme matrix was used to organize the recommendation of the literature as it was gathered (Appendix C). Those main recommendations were organized and evolved into a concept map as seen in Figure 2. The ideas gathered from the extensive integrative literature review were written education for fall

prevention; the use of multimedia for fall prevention; face to face education on fall prevention; mobility training or exercise education, physical therapy and occupational therapy education; home follow-up including: tele-rehab, nurse visits, etc.; patient-centered individualized approaches to fall prevent education; inclusion of the family, caregivers, and/or identified support systems; home modifications; medication modifications and/or nutrition status. To bridge these ideas, collaboration is needed. Collaboration will be a key factor in implementing the interventions that will prevent post hospitalized falls.



Figure 1. Conceptual map of post hospitalized fall prevention with supporting interventions at discharge. See Appendix C for reference list matching the numbers.



## Summary

The literature suggests that fall prevention requires a multi-discipline approach. To prevent a fall from occurring in the home after discharge requires the collaboration of the nurse, patient, PT, and OT. This collaboration requires active engagement in a plan to increase mobility and strength along with providing education to ensure that all precautions have been made prior to the patient discharging home from the hospital. The highest evidence supports this approach in the prevention of post-hospitalized falls.

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Appendix A  
Literature Table

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables/ Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Barker et al. (2019). Evaluation of RESPOND, a patient-centered program to prevent falls in older people presenting to the emergency department with a fall: A randomized controlled trial. <i>PLOS Medicine</i> . <a href="https://doi.org/10.1371/journal.pmed.1002807">https://doi.org/10.1371/journal.pmed.1002807</a>	Does a telephone-based patient-centered program effects falls/fall injuries of a patient with a history of falling after discharging	430 participants mean age of 73. (60-90) in ED from 2014-2015. 217 intervention group, 213 control. The Alfred and Royal Perth Hospitals in Australia.	RCT- participants were randomly assigned to groups. assessors- blinded to group allocation	With a 6-month telephone education intervention showed a decrease in falls per year $p=0.042$ . (falls person/year was 1.15 respond group and 1.83 control group)	Intervention group - home risk assessment -Home education two days of face to face -Scheduled phone follow-up and education for 6 months -home safety assessment -fall prevention exercises -coaching -Fall risk score, factors, and strategies were identified and shared with patient. -leaflet for existing services -managing risk factors such as -exercise -vision testing -glasses prescriptions -home safety modification	-home risk assessment - 6 months of telephone-based -education -coaching - goal setting - risk factor support -provide existing supportive services interventions	LEVEL II

					<ul style="list-style-type: none"><li>-sedative withdrawal</li><li>-vitamin D management)</li><li>-motivational interviewing</li><li>-creating goals and an action plan.</li><li>-Inexpensive</li><li>-Wide-reaching.</li></ul>		
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Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variab les/Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidenc e
Bernocchi et al. (2018). Feasibility and clinical efficacy of a multidisciplinary home-telehealth program to prevent falls in older adults: A randomized controlled trial. Journal of the American Medical Directors Association, 20(3) 340-346. <a href="https://doi.org/10.1016/j.jamda.2018.09.003">https://doi.org/10.1016/j.jamda.2018.09.003</a>	feasibility/efficacy of a tele-rehab/home-based program to prevent falls in older adults with more than one chronic disease after being hospitalized for a chronic condition.	283 patients 141 intervention group 142 control group	RCT. A program ran by a physiotherapist involving exercise focusing on strength, balance, and walking. -weekly status, symptoms and support. -Measure number of falls in 6 months, number of falls that were greater than 2, and how long till first fall.	Falls in 6 months 29 falls in intervention group. 56 falls in control group. (p<.001) Risk of falls reduced in intervention group (relative risk = 0.60, 95% CI: 0.44-0.83; p<.001) Mean SD time to first fall was longer in intervention group than control group (p=.001) Patients experienced 2 or less falls in the intervention group vs the control group (P= .020)	Fall prevention -physiotherapist To provide: -home exercises -strength -balance -walking. -role of the nurse is to provide weekly phones calls to monitor the patient's status, identify symptoms and provide support and education.	-Tele rehab program -medical/nursing surveillance	LEVEL II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables/ Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Bischoff-Ferrari et al. (2016). Monthly high-dose vitamin D treatment for the prevention of functional decline: a randomized clinical trial. <i>JAMA Internal Medicine</i> . 176(2) 175-183. <a href="https://doi.org/10.1001/jamainternmed.2015.7148">https://doi.org/10.1001/jamainternmed.2015.7148</a>	Does high-dose vitamin D effective in lowering the risk of functional decline	Zurich, Switzerland for one year in 200 men and women over the age of 70 (mean age 78)with a history of falls.	Double-blind, randomized clinical trial 3 groups receiving different doses of vitamin D3 24000 IU 60000 IU 24000 IU + 300ug of calcifediol	At 1-year occurrence s of falls was higher in 60 000 IU group and the 24 000 IU plus calcifediol group compared with the 24 000 IU group (p= 0.048) Mean falls 60 000IU (mean 1.47) 24 000IU plus calcifediol (mean 1.24) 24 000IU mean (0,94) (p=0.09)	-Increasing dosing of Vitamin D higher than 24 000IU -adding calcifediol shows no reduction in falls.	Increasing dose of Vitamin D Adding calcifediol Does not decrease risk of falling.	LEVEL II



Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
<p>Cerilo (2016) Effectiveness of fall prevention multimedia program on patient awareness, self-efficacy, and engagement. <i>ProQuest Dissertations &amp; Theses Global: The Humanities and Social Sciences Collection.</i> (1861215759). <a href="https://search-proquest-com.wsuproxy.mnpals.net/docview/1861215759?accountid=15069">https://search-proquest-com.wsuproxy.mnpals.net/docview/1861215759?accountid=15069</a></p>	<p>-Enhance fall risk awareness in the hopes of building confidence and engagement of strategies to prevent falls once discharged. -Examine relationship between demographics and fall risk awareness, self-efficacy, and engagement</p>	<p>65 and older patients admitted either telemetry or medical-surgical units at Cleveland Clinic in Florida, English Speaking, ambulatory or uses mobility aids, scores lower than a 3 on a Mini-Cog Test. 95% had greater than 3 comorbidities</p>	<p>Quasi-experimental design, Fall risk awareness questionnaire to assess the patient's awareness of their fall risk Assessment of the patient's confidence in completing daily activities without falling using a falls efficacy scale. Multimedia (text, audio, video, animation) to educate Use of a patient activation instrument to measure the patient's engagement posttest to assess effectiveness of a multimedia program on awareness of fall risks, self-efficacy, and engagement in fall prevention strategies</p>	<p>- Multimedia produced higher levels of falls self-efficacy and engagement. self-efficacy and engagement showed no significant differences. -fall risk awareness in fall prevention showed a significant difference (p&lt;0.05).</p>	<p>-Nurse reinforcement programs for fall prevention have potential to increase awareness of fall risks and strategies for patients. -Reinforce patient assessment/educated on fall prevention both on admission/discharge. -High need for patient engagement to prevent falls. - significance in the patient's awareness</p>	<p>-fall prevention video -preventing falls -calling for help -why prevention is important -what the fall protocol includes -how to avoid falling -use of alarms -how staff can help, -instructions when you fall -family inclusion and management of care -nurse reinforcement program (safety instructions reinforcing video)</p>	<p>LEVEL III</p>

<b>Citation / Search Engine Used</b>	<b>Purpose/ Objectives</b>	<b>Study population/ Sample/ Setting</b>	<b>Study Design/ Methods/Variables/Instruments and Measures</b>	<b>Result(s)/ Main Findings</b>	<b>Implications /critique</b>	<b>Comments Themes</b>	<b>Level of Evidence</b>
Chien & Guo (2014). Nutritional status and falls in community-dwelling older people: a longitudinal study of a population-based random sample. PloS one, 9(3), e91044. Doi:10.1371/journal.pone.0091044	Is nutritional status a prediction of falls in older adults	Mean age 69.5 living in Taiwan 4400 participants	Random sample using a survey of Health and Living Status of the Elderly (SHLSET) Interview surveys of participants who live in community dwellings Included were participants who were given a nutritional status assessment ( Minimum Nutritional Assessment Taiwan Version 2) followed for one year on the incidence of falls	Significant findings for nutritional status to independently predict falls in older people. Not well-nourished older adults had a significantly higher risk of falling (p<0.001)	Nutritional status should be addressed prior to discharge and collaboration with dietitian	Collaborative measures on nutrition and dietary efforts.	LEVEL VI

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables/Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
<p>Chu et al. (2016). An occupational therapy fall reduction home visit program for community-swelling older adults in Hong Kong after an emergency department visit for a fall. <i>Journal of the American Geriatrics Society</i> 65(2) 364-372. <a href="https://doi.org/10.1111/jgs.14527">https://doi.org/10.1111/jgs.14527</a></p>	To determine the effects of an OT fall reduction home visit program for older adults after discharging from the hospital with a fall history.	3 acute care hospitals in Hong Kong, 311 individuals 65 and older, previous fall history.	<p>Single-blind, multicenter, randomized controlled trial.</p> <p>Intervention group received an occupational therapist home visit within 2 weeks after discharging and the control group received a visit from an untrained fall prevention research assistant</p> <p>Followed 12 months via phone q 2 weeks by blinded assessors</p>	Number of fallers after one-year p=0.03	<p>Suggests OT visit after a fall and one visit at 6 months after a fall.</p> <p>Nursing implications in collaboration with OT for high risk fall patients</p>	-Home visit from OT after discharge from hospital with a history of falls.	LEVEL II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables/Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Ciance (2014). Education and engaging elders in the sure stepsRTM fall prevention program <i>Walden University</i> . <a href="https://sigma.nursingrepository.org/bitstream/handle/10755/18718/CianceAbstractInfo.pdf?sequence=2&amp;isAllowed=y">https://sigma.nursingrepository.org/bitstream/handle/10755/18718/CianceAbstractInfo.pdf?sequence=2&amp;isAllowed=y</a>	To determine the effects of reducing falls for adults.	10 patients over 65years who were receiving services from Visiting Nurses Association	Convenience sample of 10 patients who participated in Sure StepsRTM program and follow phone survey after one month. Falls Efficacy scale by Tinetti. Phase 1 nurses reviewed medication, symptom logs and fall prevention guidebook. PT completed fall scale and provided education on balance and exercise. Phase 2 was a follow-up call with falls scale	Follow up scale was not significant . However, all 10 reported no falls. Each scale collected either remained the same or improved.	-Enhance knowledge on fall prevention in the elderly by giving tools and reviewing risk factors with them -Maintain contact on monthly basis for an entire year.	Review with patients -medications -symptoms -provided a guidebook which was reviewed PT retrieves a Falls Efficacy Scale (FES) score -PT educates on balance and exercise -follow-up includes a monthly telephone survey for one year	LEVEL III

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables/Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Hayes (2017). A multifactorial intervention program for reducing fear of falling and fall risk in the geriatric population. <i>ProQuest Dissertations &amp; Theses Global: The Humanities and Social Sciences Collection.</i> (2001240564). <a href="http://wsuproxy.mnpals.net/login?url=https://search-proquest-com.wsuproxy.mnpals.net/docview/2001240564?accountid=15069">http://wsuproxy.mnpals.net/login?url=https://search-proquest-com.wsuproxy.mnpals.net/docview/2001240564?accountid=15069</a>	Investigate the efficacy of lower extremity strength exercises and balance training for reducing the fear of falling and fall risks in the geriatric population	Literature search in 2017 with evidence in the geriatric population that supports balance training, fear of falling and has a high level of evidence.	A literature search on the efficacy of fall prevention intervention programs that include strengthening and balance training compared to just balance training for fall risk and fears of falling.	Both strengthening and balance training are effective in improving the geriatric populations fear of falling and their fall risk.	Implement both balance and strength training in the elderly interventions for fall risks.	-Strength training -Balance training	LEVEL V

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables/Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Hill et al. (2019). Falls after hospital discharge: a randomized clinical trial of individualized multimodal falls prevention education. <i>Journal of Gerontology Series A: Biological Sciences &amp; Medical Sciences</i> , 74(9), 1511-1517. <a href="https://doi-org.wsuproxy.mnpals.net/10.1093/gerona/glz026">https://doi-org.wsuproxy.mnpals.net/10.1093/gerona/glz026</a>	Evaluation of the effects of providing individualized fall prevention education	3 hospitals Western Australia. 382 patients over 60 years. (mean age 77.7) Mental test score greater than 7/10 for cognition.	Single-blinded RCT – intervention is a tailored education with a video and workbook with a discussion and goal setting training by a therapist.	No significant differences in fall rates between intervention/control groups (95% CI 0.78 to 1.52)	Individualized fall program consisting of: -Workbook, digital education video, face to face individual education, action plan created, monthly follow-up calls for 3 months (goal to raise motivation, identify both social and environmental opportunities to implement prevention strategies)	-Education material in a workbook -Digital video on falls and fall prevention -Face to face discussions with therapists on an individual basis. -goal-orientated action plan for home -Monthly phone calls for 3 months for reinforcement of the education and to modify plan as needed.	LEVEL II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables/Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Hopewell et al. (2018) Multifactorial and multiple component interventions for preventing falls in older people living in the community. <i>Cochrane Database of Systematic Reviews</i> . 7, No.: CD012221. doi:10.1002/14651858.pub2.	Assessment of benefits/harms of multifactorial, multiple component interventions in preventing falls.	62-85 years. 248 participants (median 77 years)	RCT's, individual or cluster trials with multifactorial/multiple component interventions on falls in older adults compared to usual care consisting of no change in activities or attention control including social visits or exercise as a single intervention.	Multifactorial interventions including exercise may reduce falls compared to usual care or attention control.	Implementation of fall prevention multifactorial interventions including exercise	-exercise -social visits -environment -med review -psychological interventions	LEVEL II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables/ Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Kamei et al. (2014). Effectiveness of a home hazard modification program for reducing falls in urban community-dwelling older adults: A randomized controlled trial. <i>Japan Journal of Nursing Science</i> 12(3) 184-197. <a href="https://doi.org/10.1111/jjns.12059">https://doi.org/10.1111/jjns.12059</a>	Determine the potential improvement of fall prevention awareness, behaviors towards home modifications, and to decrease indoor falls by way of a home hazard modification program (HHMP)	130 adults over 75 living in Tokyo metropolitan region	Both control and intervention group received four, two-hour programs that included education on fall risk factors, nutrition, foot care, and exercise sessions. The intervention group received education/practice on home safety with the use of a model mock-up of a typical home in Japan.	The intervention group showed a 10.9% reduction in overall falls and a 11.7% reduction in indoor falls in 52 weeks.	HHMP to improve awareness of fall prevention and a change in home modification behaviors	-four 2-hour sessions including: -fall risk factors -nutrition -foot care -exercise -education -practice in home safety.	LEVEL III



Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables/ Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Lee et al. (2014). Falls prevention education for older adults during and after hospitalization: A systematic review and Meta-analysis. <i>Health Education Journal</i> , 73(5), 530-544. <a href="https://search-ebscohost-com.wsuproxy.mnpals.net/login.aspx?direct=true&amp;db=eric&amp;AN=EJ1037231&amp;site=ehost-live">https://search-ebscohost-com.wsuproxy.mnpals.net/login.aspx?direct=true&amp;db=eric&amp;AN=EJ1037231&amp;site=ehost-live</a>	Assess effectiveness of education, promotion of behavior changes, and the uptake of prevention activities during and after hospitalization of the older adult.	Use of 5 health science databases in November of 2012. Use of studies with patient education as a single intervention or multifactorial fall prevention programs in the hospital or post-discharge were included.	Systematic review and meta-analysis to assess effectiveness of patient education on fall prevention compared to usual care. RR 0.78, 95% CI 0.7 to 0.87	Fall prevention programs that contained patient education were effective in reducing fall rates in discharged older adult patients.	Fall prevention education is recommended for older adults while hospitalized and at hospital discharge and at follow up.	-face to face patient education -multimedia materials -written information -interpersonal contact.	LEVEL I

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Liu-Ambrose et al. (2019). Effect of a home-based exercise program on subsequent falls among community-dwelling high-risk older adults after a fall. A randomized clinical trial. <i>JAMA</i> 321(21) 2092-2100. <a href="https://doi.org/10.1001/jama.2019.5795">https://doi.org/10.1001/jama.2019.5795</a>	what are the benefits of a fall prevention intervention of a home-based exercise program on post fall prevention	296 Adults ages 70 and above. (mean age 81.6) Fall history, one year.	Single-blind, randomized clinical trial Home strength and balance retraining exercise program taught by a physical therapist versus usual care of fall prevention provided by a geriatrician.	absolute difference in the incidence of falls per person-year was 0.74 (95% CI 0.04-1.78; p=0.006). The incident rate ratio was 0.64 (95% CI, 0.46-0.90; p=0.009). A home-based strength/balance/exercise program shows a significant reduction in falls compared to usual care at discharge.	-education with follow-up -home program -PT versus provider education.	-strengthening -balance -exercise	LEVEL II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods Variables/ Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Luz, Bush, & Shen, (2017). Do canes or walkers make any difference? Nonuse and fall injuries. <i>The Gerontologist</i> 57(2) 211-218. <a href="https://doi.org/10.1093/geront/gnv096">https://doi.org/10.1093/geront/gnv096</a>	To determine in falls and fall injuries if walkers or canes are being used.	262 participants in Michigan 60 and older in a community dwelling with a history of falls that are cognitively intact	Cross-section study using self-administered written survey	75% of fallers were not using a prescribed device at the time of the fall. Higher incidents of falls with injury causing surgery in non-users (100%). 68% never received a home safety evaluation. 50% received training on the proper use of their device.	-emphasize importance of device and prevention of falls with patient education -Promote relevance, fitting, and training prior to discharge -promote acceptability of a device	Reason for not using device: -Believe they did not need it -forgetfulness -felt old when using device -inaccessibility -didn't think they were doing something that would cause injury	LEVEL VI

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
<p>Matchar et al. (2017). Randomized controlled trial of screening, risk modification, and physical therapy to prevent falls among the elderly recently discharged from the emergency department to the community: The steps to avoid falls in the elderly study. <i>Archives of Physical Medicine &amp; Rehabilitation</i>, 98(6), 1086-1096. <a href="https://doi-org.wsuproxy.mnpals.net/10.1016/j.apmr.2017.01.014">https://doi-org.wsuproxy.mnpals.net/10.1016/j.apmr.2017.01.014</a></p>	<p>Evaluation of the effectiveness of a program including PT to reduce falls in high-risk elderly that are discharged from the ED.</p>	<p>Adults greater than 65 who discharged home from a fall/fall injury</p>	<p>Randomized controlled trial Double blind peer review</p>	<p>Patient falls within 9 months for both control and intervention groups P=0.146 Intervention group on injurious falls p=.041 Less physical deterioration p= 0.029 Less than 2 comorbidities with at least one fall p=.002</p>	<p>-Adding PT to fall prevention in patients with minimal comorbidities.</p>	<p>- PT that focused on training in strength, gait, and balance for 3 months. -Visual screening -polypharmacy -environmental hazards -more comorbidities the higher the risk of falling -less than 2 comorbidities could benefit, but greater than 2 comorbidities do not benefit from a program tailored on PT.</p>	<p>LEVEL II</p>

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Nasari et al. (2019). Evaluation of Tailored falls education on older adults' behavior following hospitalization. <i>Journal of the American Geriatrics Society</i> , 67(11), 2274-2281. <a href="https://doi-org.wsuproxy.mnpals.net/10.1111/jgs.16053">https://doi-org.wsuproxy.mnpals.net/10.1111/jgs.16053</a>	To evaluate the effect of a tailored education program in the hospital on older adult -engagement in fall prevention strategies within 6 months after hospital discharge	292 participants ages 60 years and older with good cognitive function (greater than 7 of 10 abbreviated Mental test score) that discharge from a hospital rehab ward in Australia	Randomized controlled trial with a goal in improvement of older adult fall prevention behaviors after hospital discharge.	292 participants who completed the trial (149 intervention and 143 control) no significant differences between groups who received ADL assistance p=0.3, home modifications p=0.4, exercise p=0.3.	-High amount of unmet ADL needs in both groups, increase in participant dependency at 6 months compared to admission date -Engagement of exercise increased by 30% post hospitalization, however the duration went from 3 hours to 1 hour/week at 6 months follow up.	-Tailored education shows no increase in engagement in strategies to prevent falls after hospitalization.	LEVEL II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Potter et al. (2014). An instructional DVD fall-prevention program for patients with cancer and family caregivers. <i>Oncology Nursing Forum</i> , 41(5), 486-494. <a href="https://doi-org.wsuproxy.mnpals.net/10.1188.ONF.486-494">https://doi-org.wsuproxy.mnpals.net/10.1188.ONF.486-494</a>	To determine the efficacy of a fall-prevention skills training program for patients with cancer and family caregivers.	A comprehensive cancer center in the midwestern United States.	Randomized controlled trial with repeated measures and postintervention measure of fall occurrence.	The number of falls was lower for the tx group; the difference was not statistically significant. Dyads in tx group showed greater improvement in fall risk awareness and prevention knowledge -Mobility skills training is a promising educational intervention for reducing falls occurrences in the home for patients with cancer.	Efforts needed for improving the knowledge and skills of cancer survivors and family members in -patient fall risks -making home adjustments -performing mobility skills	-Mobility training is an intervention that reduces fall occurrences in the home.	Level II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Sherrington et al. (2014). A post-hospital home exercise program improved mobility but increased falls in older people: A randomized controlled trial. <i>PLoS ONE</i> 9(9): e104412. Doi:10.1371/journal.pone.0104412	To investigate the effects of a home exercise program on mobility and falls among patients recently hospitalized and discharged to home.	340 older patients greater than 60 years old. Admitted and discharged from various areas in Sydney, Australia. English speaking, no cognitive impairment	Parallel pragmatic randomized controlled trial (equal allocation to control groups and intervention groups)	Intervention group reported more falls (177 falls) in 12 months than the control group (123 falls). (p=0.017). Performance based mobility showed improvement between the intervention group (p=0.004). ease of undertaking mobility tasks was not significantly different between groups (p=0.488). Fall program improves performance mobility but shows an increase in the rate of falls after discharging home from the hospital.	-Experienced physiotherapists did home visits to educate on a 20-30-minute program on lower limb balance and strengthening exercises 6 days a week.	-Wt. bearing exercises for Better Balance: <a href="http://www.webb.org.au">www.webb.org.au</a> . -Physiotherapists assessed ability and prescribed the amount of reps for each exercise depending on ability. Exercises included: -standing with narrower base, forwards and side stepping, reaching activities, lower limb extensor reps, sit to stands, lateral step-ups on blocks and heel raises. -use of weight belts/vests. -use of stabilizers for balance exercises -safety precautions, instructions, and photos of exercises provided -log book provided for tracking exercise	LEVEL II

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Ueda et al. (2017) Tailored education program using home floor plans for falls prevention in discharged older patients: A pilot randomized controlled trial. <i>Archives of Gerontology and Geriatrics</i> 71 9-13. <a href="https://doi.org/10.1016/j.archger.2017.02.010">https://doi.org/10.1016/j.archger.2017.02.010</a>	To research the effects of a tailored education program for fall prevention of older patients that utilizes floor plans.	Discharged orthopedic patients over 65 who are discharging home and have had a fall in the past year.	Single-center, parallel, pragmatic, pilot randomized controlled trial with equal allocation to the intervention and control groups. Control group and intervention group received standard care exercises at discharge. The intervention group also received a tailored education program using home floor plans to prevent falls. Blinded evaluators.	No falls in the intervention group. 2 falls in the control group Near falls: 7 intervention group; 13 in control group. 75% less near falls in the intervention group. Cox proportional hazards model (hazard ratio 0.25; 95% CI, 0.09-0.75)	The tailored education program using home floor plans was effective in falls and near falls of discharging orthopedic patients.	-Tailored education program using home floor plans.	LEVEL II



Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Van Ancum et al. (2018). Muscle mass and muscle strength are associated with pre and post-hospitalization falls in older male inpatients: a longitudinal cohort study. <i>BMC Geriatrics</i> , 18(1), 1-7. <a href="https://doi-org.wsuproxy.mnpals.net/10.1186/s12877-018-0812-5">https://doi-org.wsuproxy.mnpals.net/10.1186/s12877-018-0812-5</a>	Is there a link between muscle measures and pre and post-hospitalization falls in older patients?	378 inpatients Age 70 years and older in an academic teaching hospital.	Inception cohort of patients. Muscle mass, hand grip strength measured on admission using bioelectrical impedance analysis and dynamometry. Pre-hospitalized patients were dichotomized of having one fall prior to hospitalization and post hospitalization falls were dichotomized of having a fall within three months after discharge.	Lower muscle mass was associated with post-hospitalization falls and lower hand grip strength was associated with pre and post-hospitalized falls in males only	-Strength and muscle mass are associated with pre and post-hospitalized falls in older male patients	-Strength training for fall prevention in male patients.	LEVEL IV

Citation / Search Engine Used	Purpose/ Objectives	Study population/ Sample/ Setting	Study Design/ Methods/ Variables Instruments and Measures	Result(s)/ Main Findings	Implications /critique	Comments Themes	Level of Evidence
Webster et al. (2019) 30 occupational therapists delivering patient and caregiver home safety education in a rehabilitation setting, <i>Age and Ageing</i> , 48(3) 31-316 <a href="https://doi-org.wsuproxy.mnpals.net/10.1093/ageing/afz102.04">https://doi-org.wsuproxy.mnpals.net/10.1093/ageing/afz102.04</a>	Is there greater benefit from caregiver inclusion in education on fall prevention and home environment modifications to facilitate a safe home at discharge.	160 bed rehabilitation hospital 385 attendees in 21 groups.	Mixed-method design. Quantitative data gathered using a 10-point Likert scale on perceived knowledge about fall risk factors, modifiable environmental factors, managing falls, access to support/info to reduce fall risks.	Increase in knowledge was 30% in all four areas (risk factors, modifiable environment, management of falls, accessibility to information) and overall increase of 32% in knowledge.	Include caregivers in education on fall prevention and home modifications.	-OT power point on adaptive equipment. -Engagement with patients -handouts on home safety assessment tools for home modification for patients/care givers.	LEVEL VI

APPENDIX B

Table 1

*Data Abstraction Table*

Date of Search	Keyword Used	Database/Source Used	# of Hits		
			Listed	Reviewed	Used
12/17/2019	discharge education on fall prevention OR fall risk	Google Scholar	17,400	43	7
12/17/2019	High fall risk, discharge education or discharge instructions or discharge teaching, and adults, or adult, or elderly	PubMed.gov	18	16	4
12/17/2019	High fall risk, discharge education or discharge instructions or discharge teaching, and adults, or adult, or elderly	Ovid	2	2	0
12/17/2019	High fall risk or high fall risk patients, discharge education or discharge instructions or discharge teaching, and adults, or adult, or elderly	CINAHL Complete	17	12	5
12/17/2019	High fall risk, discharge education or discharge instructions or discharge teaching, and adults, or adult, or elderly	Cochrane Library	17	6	2
12/27/2019	High fall risk, discharge education or discharge instructions or discharge teaching, and adults, or adult, or elderly	ProQuest Dissertations & Theses	66	12	2

## APPENDIX C

### Theme Matrix

ITEM	AUTHOR	CRITERIA FOR DISCHARGE INTERVENTION THEMES			INTERVENTION THEMES									OUTCOME THEMES	
		Green A	Green B	Green C	Yellow A	Yellow B	Yellow C	Yellow D	Yellow E	Yellow F	Yellow G	Yellow H	Yellow I	Blue A	Blue B
1	Barker		X						X	X				X	
2	Bernocchi		X						X					X	
3	Bischoff-Ferrari		X	X								X			X
4	Cerilo		X			X								X	
5	Chien		X									X		X	
6	Chu		X	X				x						X	
7	Ciance		X					X						X	
8	Hayes	X	X					X						X	
9	Hill		X		X	X	X								X
10	Hopewell		X					X	X					X	
11	Kamei		X		X	X	X	X	X	X		X		X	
12	Lee		X		X	X	X							X	
13	Liu-Ambrose		X	X				X						X	
14	Matchar	X	X	X				X						X	
15	Naseri	X	X							X					X
16	Potter		X					X			X			X	
17	Sherrington		X					X	X					X	
18	Ueda	X	X	X						X		X		X	
29	Van Ancum	X	X	X				X						X	
20	Webster		X								X	X		X	

#### KEY

Green A: Scored a medium to high fall risk at time of discharge

Green B: Age greater than 60

Green C: History of falls

Yellow A: Written education fall prevention material

Yellow B: Multimedia education fall prevention material

Yellow C: Face to Face education on fall prevention

Yellow D: Mobility training or exercise education/PT/OT

Yellow E: Home follow-up (tele rehab, nurse visit, etc.)

Yellow F: Patient centered fall prevention education

Yellow G: Education includes family/caregiver/identified support system

Yellow H: Home modifications

Yellow I: Medication/Nutrition status modifications

Blue A: Reduction in fall rates after Discharge

Blue B: No change in fall rates after discharge