

**Prevention of Falls Injury Among Elderly Patients: A Narrative Review**

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Correspondence Author: Mahacen Egal Alnadwi, Collage of Medicine, Umm Al-Qura University, Mecca, Saudi Arabia**Type of Publication:** Original Research Paper**Conflicts of Interest:** Nil**Abstract**

Introduction: Fall-related injuries are associated with long period of hospitalization particularly for the elderly. This review compared and evaluate the effectiveness of interventions used for prevention of falls in elderlies.

Methods: An electronic search on the search engines PubMed, EBSCO, and Google scholar was conducted to identify the relevant published studies using the key words: falls, inpatient, hospital, nursing, prevention, and clinical trial. The search was limited to clinical trial, English language, and full text.

Results: A total of seven randomized clinical trials were identified according to the search criteria; one of them was double blind controlled study and one was cluster randomized trial. Different intervention modalities have been implemented. Some of them targeted the nurses and physiotherapists (prevention education programs) and the others targeted directly the patients (additional exercises, vitamin D supplement, and prevention programs)

Conclusions: Prevention of fall should be considered as interdisciplinary program where cooperation should be run between the medical team, patient, and patient's family.

Keywords: Fall, Injury, Elderly, Prevention, Intervention

Introduction

The mortality rate caused by falls increases with age progress in both genders and in all ethnic and racial groups. There are some common risk factors for falls in

the elderly which include age progress, use of medication, cognitive and sensory impairment.

Evaluation of a patient who has fallen should include a thorough and focused history with an emphasis on patient's medications, a physical examination including postural control test and overall physical function ^(1, 2). According to the Centers for Disease Control and Prevention (CDC), approximately third of community-dwelling adults older than age 65 years fall every year, and fall is more frequent in women than men in the same age-group. This percentage increases to 75% of nursing home residents which may related the old age, susceptibility, medical status (especially chronic), and cognitive impairments. Between 30% and 51% of falls can result in an injury ^(3, 4).

Many factors contribute to be behind a fall in a hospital including the following: elderly persons, acuity rising of patient, no enough nurses, work environment is inefficient for caregivers, and lack of a safe climate culture. Fall causes are not limited to the intrinsic factors (such as: chronic illness or previous history of fall), but falls are caused by multiple factors ⁽⁵⁻⁷⁾.

For the matter of fact, falls are considered the leading cause of injury and accidental death among persons older than 65 years. Injuries resulting from fall may include injury of soft tissue, fractures (spine, wrist, and hip) and traumatic brain injury. Fall-related injuries are associated with long period of hospitalization particularly for the

elderly. Also, fall-related injury can significantly modify the quality of life ⁽⁸⁻¹⁰⁾. This review compared and evaluates the effectiveness of interventions used for prevention of falls in elderlies.

Methods

An electronic search on the search engines PubMed, EBSCO, and Google scholar was conducted to identify the relevant published studies using the key words: falls, inpatient, hospital, nursing, prevention, and clinical trial. The search was limited to clinical trial, English language, and full text. The references lists of the resulting articles were screened for additional studies. All targeted articles were subjected to the framework PICO (P= Population; I= Intervention; C= Comparison; O= Outcome). The review of the articles included analysis of the research topic, literature review, design of the studies, the method of data collection and analysis, findings and conclusions, critical summaries, appraisal of method and synthesis and findings and reflection on practice as suggested by ^(11, 12).

Results and Discussion

A total of seven randomized clinical trials were identified according to the search criteria; one of them was double blind controlled study and one was cluster randomized trial. Different intervention modalities have been implemented. Some of them targeted the nurses and physiotherapists (prevention education programs) and the others targeted directly the patients (additional exercises, vitamin D supplement, and prevention programs). Different tools have been used to evaluate the results. Most of the studies have poorly defined the success criteria and some of them had too small sample sizes.

A complete and thorough approach to the individual, susceptible to fall, and environment is important. In a person of a high risk of fall screening and professional falls risk assessment should be conducted to achieve more details of the individual's risk factors of falling. This

requires using a tool which has been evaluated by researchers and validated to be useful in distinguishing the causes of falls in an individual. Reassessment of falls risk factors may be required because the patient's health and circumstances might change with time. Different scales have been recommended for determination of falling risk by using a validated tool such as the Fall Risk Assessment ⁽¹³⁾, The Conley Scale ⁽¹⁴⁾, or the FRAINT Tool for assessment of fall risk ⁽¹⁵⁾. Risk factors of fall include recent history of falls, emotional stress such as depression, confusion, postural hypotension, some systemic diseases such as cardiovascular/respiratory disease, altered mobility, altered elimination patterns, dizziness or vertigo, Altered oxygen supply, and some malignancies ^(13, 16, 17). Some other predictors of fall risk could include neurological problems, living alone, atrial fibrillation, and not adhering to an exercise program ⁽¹⁸⁾.

Stability and mobility skills of all patients should be evaluated using tools such as the Balance Scale by Tinetti ⁽¹⁹⁾ or the Get Up and Go Scale by Mathais ⁽²⁰⁾. Determine the patient's functional abilities are helpful to determine methods of safety ensuring or to improve the problem areas ⁽²¹⁻²³⁾. Subsequent falls can occur in patients who attend to another task while walking, such as: clothing or carrying a cup of water/tea ⁽²⁴⁾. Increasing safety measures particularly while transferring is the most important prevention ways to reduce the risk of falls for nonambulatory residents. This involves careful locking of wheelchairs and beds before moving ⁽²⁵⁾. Immobile patients are more frequent to have serious injuries when they fall. Using a band like "high-risk fall" arm band and room marker are helpful in alert the nursing staff to increase attention of the increased risk of falls ⁽²⁶⁾.

Undertaken medications should be evaluated to identify if these medications increase the falling risk. Replacing patient's medication might be needed after the patient's

physician consultation. Taking more than four medications has been documented to be associated with increased falls. Medications that increase the falls risk include hypnotics, opiates, antidepressants, diuretics, sedatives, and psychotropic and anti-hypertension agents⁽¹⁷⁾. Other medications such as benzodiazepines, antipsychotic or antidepressant medications which given for sleep problems can also increase the rate of falls⁽²⁷⁻²⁹⁾. Increase in the incidences of falls in a nursing home setting can occur when using selective serotonin reuptake inhibitors or tricyclic antidepressants^(30, 31). Some other aids like call light within reach and show the patient how to call for assistance, ensuring that wheels of the bed or chair are locked, maintaining bed in a low position, and keeping dim light at night may also be helpful^(28, 32). Keeping the path to the bathroom clear, labeling the bathroom, and leaving the door open might be necessary because most of falls are associated with toileting. For some patients, it is more acceptable to fall than to "wet yourself." Some studies have reported that falls are more associated to the need to eliminate in a hurry^(17, 26). Controlled (restrained) elderly patients often experience an increase in the number of falls, which might due to muscle loss of coordination or deconditioning^(17, 33). Severe injuries such as asphyxiation, strangulation, or head injury can occur when elderly patient is restrained and fall⁽³⁴⁾. Facilities that use restraints can help in increase the deficiencies in patients' activities of daily living than restraint-free facilities⁽³⁵⁾. It has been reported that restraint use can lead to infection, anger, depression, deconditioning, pressure ulcers, and sometimes death⁽³⁶⁾. Mechanical restraint put the patient at high risk of falling⁽³⁷⁾. However, nighttime fall rates has shown the same rate between who were restrained and those who were not restrained⁽²⁸⁾. Patients can be surrounded by using a special safety bed. This bed could be an alternative

method to restraints and can help keep the patient safe during periods of distress⁽³⁸⁾. For Geriatric patients, using walking aids when ambulating or wearing glasses are helpful. Wearing a hip protector can also help to reduce falls. These are specially-designed protectors including a pocket on each side for protector placement. Using an anatomically designed external hip protector can reduce the risk of hip fracture in elderly patients when ambulating⁽³⁹⁾. Some patients may experience dizziness when getting up because of orthostatic hypotension. In such a case, teaching methods are helpful to decrease dizziness. These methods include getting up slowly, waiting seated for few minutes before getting up, immediately sitting down if feeling dizzy, and trying to ask for help when standing. Postural hypotension is also common in elderly patients. It occurs because that the compensatory mechanisms become unable to maintain blood pressure when getting up and because of the decrease in baroreceptor sensitivity^(40, 41). Strength training by using free weights or machines or any other physical therapy could be recommended. Improvement of strength in response to exercise is possible even in very elderly patients with functional disabilities or multiple chronic diseases. Falls can be prevented with increased strength⁽⁴²⁾. In the study of Cumming et al.⁽⁴³⁾ a cluster randomized trial was conducted to determine the efficiency of a targeted multifactorial falls prevention program among nurses and physiotherapists in 24 elderly care wards in 12 hospitals. The prevention program was implemented in 3999 elderly patients with mean age of 79 years. The prevention program included risk assessment of falls, staff and patient education, drug review, modification of bedside and ward environments, an exercise program, and alarm for selected patients. The outcome measured was falls during hospital stay. The weakest point in this study was

the period of follow-up which was only seven days. Moreover, the results in this study were presented as only frequency of falls which occurred during the study. The results revealed no significant difference between the intervention group and control group which was related to the short follow-up time. Another reason might be the nature of methodology of the study as the presence of multiple intervention factors with no control for the confounding factors which might affect or modify the results. A similar randomized control trial conducted by Haines et al.⁽⁴⁴⁾ to assess the effectiveness of a targeted multiple intervention falls prevention program in reducing falls and injury related to falls. Six hundred and 26 patients were involved in this study. The prevention program included falls risk alert card, exercise program, education program, and hip protector. There were 30% fewer falls in the intervention program than in the control group. These results, however, were only effective after the day 45 of study. Sampling technique and allocation of patients were poorly defined in this study. Also, there were some difficulty to blind all staff and participants. It is somewhat difficult to generalize the results of this study because of the above-mentioned reasons plus the presence of multiple intervention modalities that may affect the outcome results.

Additional exercise for old hospital inpatients was implemented in randomized controlled trial among 173 patients to prevented falls⁽⁴⁵⁾. The prevention program was provided by one physiotherapist for each four patients. However, not all therapeutic elements could be incorporated into every exercise. Moreover, high dropout rate was recorded (80 out of 173). In addition, not all patients completed all base line test which may affect the validity of the results. The authors called for future research to investigate the effect of the exercise program independently of the patient-sitter effect. Another

randomized double-blind controlled study was conducted by Burliegh et al.⁽⁴⁶⁾ to evaluate the effect of routine supplement of calcium plus vitamin D in reducing the number of falls. Participants were randomly assigned to test group (vitamin D + calcium) and control group (calcium only). No significant difference was found between intervention and control groups. The supplement of vitamin D with the daily routine calcium has no effect in reducing the number of falls. The vitamin D deficiency among participants in the intervention group was not controlled which may affect the results. The authors related the outcome results to the period of treatment and participant numbers.

Barreca et al.⁽⁴⁷⁾ examined the effect of sit-to-stand (STS) exercise in reducing the frequency of falls. The results revealed no effect of STS in reducing fall numbers. The sample size in this study was too small (48) comparing with the other included studies in this review. In addition, the success criteria were poorly defined which will negatively affect the outcome results and make the generalization of the results questionable. In another study, Donald et al.⁽⁴⁸⁾ compared two flooring types (carpet and vinyl) and two modes of physiotherapy (conventional and additional leg strengthening exercises) to avoid falls in elderly patients. Although the results of the study revealed significant difference in number of falls/patients when comparing carpet and vinyl floorings, no significant difference was found between conventional and additional physiotherapy modes. The weakest point found in this study was the sample size which was small with high dropout rate. Liu et al.⁽⁴⁹⁾ explored the effect of education intervention on improving knowledge level of nurses about prevention of falls in hospitalized patients. This study was implemented among 374 registered nurses from four hospitals. Data were collected before the intervention program and after 3 months. The knowledge

of participants was significantly improved. However, there was no randomization in sample selection. Also, the study measured the improvement in knowledge among nurses without measuring the health outcomes or the application of this knowledge on patients. The target population was chosen from selective hospitals so the generalization of these results is questionable.

Conclusion

Prevention of fall should be considered as interdisciplinary program where cooperation should be run between the medical team, patient, and patient's family. With reviewing the clinical trials dealing with fall prevention it can be noted that different prevention modalities have been used in different places with different environment. The results, therefore, varied considerably. Generalizing of such results for any environment is still questionable. Although the education program to prevent fall seems to be effective, more new approaches are needed and further clinical trials for each environment is highly recommended.

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