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## Reducing the Potential for Falls Among Community Dwelling Older Adults

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**SAN JOSE STATE UNIVERSITY  
SCHOOL OF NURSING**

**MASTER'S PROGRAM PROJECT OPTION (PLAN B)  
PROJECT SIGNATURE FORM**

STUDENT NAME Sharon - Xiaowen Hu

SEMESTER ENROLLED Spring, 2000

TITLE OF PROJECT Reducing the Potential for  
falls among Community dwelling older  
adults.

NAME OF JOURNAL Geriatric Nursing

The project and manuscript have been successfully completed and meet the standards of the School of Nursing at San Jose State University. The project demonstrates the application of professional knowledge, clinical expertise, and scholarly thinking. An abstract of the project and two copies of the manuscript are attached.

Marcus A. Gabe  
ADVISOR'S SIGNATURE

5/19/00  
DATE

Judith A. Monahan  
ADVISOR'S SIGNATURE

5/17/00  
DATE

Please submit this form to the Graduate Coordinator. Attach abstract, two copies of the manuscript, and documentation of submission to the journal (i.e., postal receipt).

**Sharon-Xiaowen Hu**

**Email:** [REDACTED]

May 22, 2000

Priscilla R. Ebersole, Ph.D., RN, FAAN  
Geriatric Nursing

Dear Dr. Ebersole:

I would like to submit a manuscript entitled "Reducing the Potential for Falls Among Community Dwelling Older Adults" for consideration for publication in Geriatric Nursing. This is a report on the research project completed as part of my Master Degree as a clinical nurse specialist in gerontology. I think the readers of your journal would be interested in this nursing intervention study. The statistically significant results indicated that an educational nursing intervention can help the elderly to eliminate environmental hazards and reduce the risk of falling. If you have further questions, please feel free to contact me by phone or email.

Sincerely yours,

Sharon-Xiaowen Hu

**Reducing the Potential for Falls  
Among Community Dwelling Older Adults**

**Sharon-Xiaowen Hu, RN, BS**

**Marian Yoder, RN, Ed.D, Professor**

**Judith Monahan, RN, MS, Lecturer**

**School of Nursing**

**San Jose State University**

### **Abstract**

This research study used a pre-test and post-test design to determine if a nursing educational intervention would reduce the potential for falls among the community dwelling elderly. The participants (N=15) were: (a) age 65 or older, (b) mentally competent, (c) predisposed to falls, and (d) living independently. Four instruments were utilized to collect data: (a) the Folstein mini-mental state examination (MMSE), (b) a fall predisposition scale, (c) a home assessment checklist (Tideikaar, 1987), and (d) interview questions. Statistics were used to evaluate findings. The results show that a nursing educational intervention had a positive impact to help reduce the risk of falling.

# Reducing the Potential for Falls Among Community Dwelling Older Adults

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## **Abstract**

This research study used a pre-test and post-test design to determine if a nursing educational intervention would reduce the potential for falls among the community dwelling elderly. The participants (N=15) were: (a) age 65 or older, (b) mentally competent, (c) predisposed to falls, and (d) living independently. Four instruments were utilized to collect data: (a) the Folstein mini-mental state examination (MMSE), (b) a fall predisposition scale, (c) a home assessment checklist (Tideikaar, 1987), and (d) interview questions. Statistics were used to evaluate findings. The results show that a nursing educational intervention had a positive impact to help reduce the risk of falling.

## Background

Accidental falls have a significant impact on the elderly population and the entire health care system. Preventing accidental falls is one of the most urgent and important tasks for health care professionals. The United States Public Health Service Healthy People 2000 sets a goal to reduce deaths from falls and fall-related injuries.<sup>1</sup> Falls occur frequently in the elderly population and can cause serious consequences, such as injuries, disabilities, and deaths.<sup>2</sup> Approximately 30% of elders who live in communities fall every year.<sup>3</sup> Many fall-related accidents, such as fractures, require hospitalization, costly treatment (usually surgical), and prolonged convalescent care. The yearly costs for acute care associated with fall-related fractures were estimated at 10 billion dollars.<sup>4</sup> Falls can also cause severe psychological consequences. After a fall, the older person fears falling again, and this prevents the older person from engaging in an active life and produces a cycle of increased dependency, social isolation, and depression.<sup>5</sup>

Many research studies have been conducted to identify the risk factors for falls,<sup>6-9</sup> and many programs have been developed to reduce accidental falls.<sup>3,4,10,11</sup> However, accidental falls still occur. A recent study indicated that the number of fall-related injuries and deaths has increased as the percentage of aging population has expanded in developed countries.<sup>12</sup> Very little research has investigated falls among community dwelling elders, although approximately 95% of the elderly are living in their homes.<sup>2</sup> Falls at home are often unwitnessed and often under reported, especially if there are no related injuries. In contrast, falls at nursing homes or hospitals are more likely to be observed and documented.<sup>5</sup> Many studies have suggested that falls at home may be caused by environmental hazards.<sup>8,9</sup> Since the environment plays an important role in



either causing or preventing falls, there is a great need for finding an effective way to help the elderly to eliminate home environmental hazards. The purpose of this study was to evaluate whether a nursing educational intervention regarding the elimination of environmental hazards would reduce the potential for falls among community dwelling older adults.

Most risk factors can be generally classified into two different categories: intrinsic and extrinsic.<sup>6</sup> Intrinsic risk factors include (a) impaired vision, (b) impaired mobility, (c) altered cognitive status, or (d) taking certain classes of drugs (especially sedatives, antihypertensives, and antidepressants). Extrinsic factors are usually environmental hazards, such as (a) poor lighting, (b) lack of a grab bar in the bathroom, (c) clutter on the floor, and (d) slippery surfaces.<sup>6</sup> Risky behavior, including climbing on chairs to reach high shelves, hurrying, and running while carrying heavy objects or in areas of poor lighting, has also been recognized as a fall risk factor.<sup>6</sup> One study indicated that many community dwelling elders lived in older houses with structural deficiencies.<sup>7</sup> These older people were accustomed to their living environmental conditions and were not aware that such conditions should be modified. This study indicated that education would heighten the elders' awareness of environmental risk factors and their willingness to adopt safety modifications.<sup>7</sup>

A large-scale quantitative study ( $N=301$ ) investigated whether the risk of falling could be reduced by modifying risk factors among the community-living elderly.<sup>4</sup> Postural hypotension, use of sedatives, use of four or more prescription medications, and impairment of arm or leg strength or range of motion, balance or gait were identified as risk factors. Elders were randomly placed into an intervention group or control

group. The subjects of the intervention group were visited by nurse practitioners and physical therapists at their homes. These subjects were also given a series of health services such as (a) adjustment in medication, (b) behavioral instructions, and (c) an exercise program to modify risk factors. The subjects in the control group were given only 1 social worker visit. The study showed that the multiple-risk-factor intervention significantly reduced the risk of falling.<sup>4</sup>

Another research study was based on the hypothesis that falls among the elderly could be reduced and prevented by adopting safety habits.<sup>6</sup> Subjects (N=3,182) were randomly assigned to either a control group or an intervention group. The intervention group was encouraged to remove the identified hazards. Information for obtaining technical and financial assistance to make safety repairs or modifications was also provided. During the 23 months of the study, 44% of the control subjects fell at least once compared to 39% of intervention group members. Findings in this particular study suggested that moderate intervention was unable to reduce incidence of falls significantly; therefore, more intensive intervention was needed.<sup>6</sup>

A qualitative study conducted by Kippenbrock and Soja provided different perspectives from the elderly who had fallen and their caregivers.<sup>3</sup> The study identified risk factors by interviewing hospitalized elderly patients with a history of falls. The most frequent risk factors identified were: (a) confusion (53%), (b) cardiovascular medical diagnosis (42%), (c) decreased mobility in the lower extremities (42%), (d) general weakness (32%), (d) elimination needs (26%), and (f) orthopedic medical diagnoses (26%).

Ryan and Spellbring investigated fall prevention using subjects selected from two senior meal sites who were randomly assigned into 2 treatment groups and 1 control group.<sup>10</sup> During the 3-month study period, the subjects in the control group did experience more falls than either one of the intervention groups. This study also demonstrated that changes made by subjects could be categorized into four types: (a) personal behavior change with no cost, (b) personal behavior change with cost, (c) environmental change with no cost, and (d) environmental change with cost. The most common change was personal behavior change with no cost.<sup>10</sup> In addition, the study found that older women had the greatest risk for fall injury due to high incidence of osteoporosis.<sup>10</sup>

Tideikaar has done multiple studies since 1970 in the area of fall prevention among elderly.<sup>1,8,9,13,14</sup> He indicated that environmental hazards were the most frequent preventable cause of falls.<sup>8,9</sup> Tideikaar developed several checklists to detect environmental hazards in different settings, made suggestions to correct each problem, and explained rationales with the checklists.<sup>8,9,13,14</sup> Because the forms are so thorough and easy to apply, Tideikaar's checklists have been utilized as tools of environmental assessment.<sup>2</sup>

### **Conceptual Framework**

The research was guided by Dorothea E. Orem's self-care deficit theory.<sup>15</sup> The theory has been widely applied in the field of health care practice and education. Orem suggested that, "...self-care is learned, goal-oriented activities of individuals. It is behavior that exists in concrete life situations directed by persons to self or to the environment to regulate factors that affect their own development and functioning in the

interests of life health, or well-being.”<sup>15</sup> According to Orem, self-care is a human need, and a nursing system is a helping system to serve each individual's need. She identified three different systems of nursing care. When a patient is unable to perform any self-care, the wholly compensatory system is required. When a patient is able to perform some of self-care, then the partly compensatory system is suitable. Supportive-educative systems are appropriate for the situations in which a patient is able to accomplish self-care. Nursing actions should focus on strengthening self-care capability and eliminating or minimizing a self-care limitation.<sup>15</sup>

Community dwelling elderly live independently, and their autonomy must be respected by health care professionals. However, to eliminate environmental hazards, the elderly must make changes in their home environment. It is critical to assist clients to understand the importance of making these changes so that they will participate in their own self-care. The necessary changes will be made, and the goal of preventing falls can be reached. In the past, the health educator's role was to convince clients to comply with directives given by helping health professionals. Currently, the educator's role is viewed as helping clients understand how they can achieve and maintain their optimal level of wellness.<sup>16</sup> The purpose of this research was to answer the question: Will a nursing educational intervention regarding the elimination of environmental hazards reduce the potential for falls among community dwelling older adults?

## **Methodology**

### **Research Design**

This research used a pre-experimental, pre-test and post-test design. Subjects were recruited from two independent living facilities for senior citizens in an urban area

of northern California. The criteria for the sample selection required that the participants be: (a) age 65 or older, (b) mentally competent, (c) predisposed to falls, and (d) living independently. A convenience sample was selected by obtaining names of potential subjects from the staff of these two independent living facilities. Potential subjects were interviewed by the investigator prior to the study. Information on the purpose of the study, criteria for participation, the procedures, and the researcher's name and phone number was provided. Over 30 elderly were interviewed initially, and 19 subjects were selected. Fifteen of the subjects remained in the study until the end.

A consent form was signed by the volunteer subjects prior to the study and confidentiality was maintained. The subjects' identities were not connected with data during the collection period and only numerical data were used for analysis.

### Research Instruments

Four instruments were utilized for data collection in this study. These included: (a) the Folstein mini-mental state examination (MMSE), (b) a fall predisposition scale, (c) a home assessment checklist designed by Tideikaar<sup>13</sup> for assessing environmental hazards, and (d) a series of interview questions used to collect demographic and medical information. The MMSE was used to determine if the candidate was mentally competent and able to learn.<sup>17</sup> The MMSE has gained wide acceptance and use as a standardized means for evaluating cognitive impairment in geriatric practice and research since 1975.<sup>18</sup> It is considered an accurate and reliable measure compared with other instruments used in screening mental function.<sup>18</sup> In this study, a MMSE score of 27 or above was used as a criteria for mental competency and inclusion in the sample.

The fall predisposition scale was developed by a group of nurse researchers after a three-month-trial on three randomly selected patient care units in the Veterans Administration Medical Center in Gainesville, Florida.<sup>19</sup> This fall predisposition scale measured 10 factors: (a) age, (b) mental status, (c) number of days in hospital, (d) incontinence, (e) history of falls, (f) uncompensated visual impairment, (g) ambulation status (confinement to a chair), (h) drop in systolic blood pressure, (i) gait and balance abnormalities, and (j) the number and classification of medications taken. Each item on the scale was assigned a point value based upon its role in contributing to falls. A score of 10 or above indicated a risk of falling in the institutional settings in which it was initially used. This fall predisposition scale was modified by the deletion of the number of days in hospital factor and was used as a fall assessment form in another institutional setting.<sup>20</sup> For this study, a score of 8 or greater was determined to be an indication of risk of falling because the length of hospital stay factor did not apply to the community dwelling elderly.

The home assessment checklist evaluated many areas of a home including exterior, interior, kitchen, bathroom, and bedroom.<sup>13</sup> It focused on 7 major environmental factors that contribute to falls: (a) ground surface, (b) lighting, (c) stairs, (d) bathrooms, (e) beds, (f) chairs, and (g) shelves. The checklist included 37 items assessing potential environmental hazards.<sup>13</sup> When using the home assessment checklist in this study, one point was given for each potential environmental hazard. The score was derived by adding the total points to determine the level of risk for falls. A higher score indicated an increased risk for falls. The score from the home assessment checklist was used as the subject's environmental hazard index in this

study. In addition, several interview questions were asked during the first visit to gather the information on age, marriage status, and major health problems.

### Procedure

Each subject received three home visits, approximately 4 weeks apart. During each home visit, the individual's concerns and questions were addressed by the investigator. The focus of the first visit was to obtain each subject's demographic and medical information, to assess mental status by using the Folstein MMSE, to assess the risk of a fall by using the fall predisposition scale and home environmental hazard checklist, and to establish a good client-nurse relationship. This initial visit required approximately 1 1/2 hours. During the second visit, education and counseling regarding each subject's environmental hazards were provided. The education and counseling focused on eliminating environmental hazards and modifying risky behaviors (such as climbing onto a chair to get things on high shelves). Written instructions regarding how to make corrections were provided and discussed with each subject. The purpose of the third visit was to assess whether or not the subjects had made any positive changes to eliminate environmental hazards in order to reduce risk of falling as well as to provide education, support, and counseling. Again the environmental hazards were measured using the home environmental hazard checklist and a score for each subject was derived.

Statistics were used to analyze the data and evaluate the effectiveness of the nursing educational intervention regarding the elimination of environmental hazards. The dependent samples  $t$ -test was used to determine if there was a significant difference in the environmental hazard scores between the first visit and the third visit.

The dependent samples  $t$ -test was appropriate for this study because the sample size was small, the environmental hazard scores were collected from the same subjects at two points in time,<sup>21</sup> and the nature of data were highly correlated.<sup>22</sup> The dependent samples  $t$ -test would help the investigator to find out if educational nursing intervention could indeed cause significant changes on a subject's environmental hazard scores.

Descriptive statistics were also used to analyze and discuss the information from subjects, such as age, marriage status, gender, primary and secondary medical diagnosis, average score of MMSE, and the average score of fall predisposition.

### **Results**

There were 15 subjects, 2 males and 13 females, who remained in the study and received all three home visits including two home environmental hazards assessment (see Table 1). The age of the subjects ranged from 65-98 years with an average age of 81.8. Most subjects were widowed and only 2 of them lived with a spouse. All of these elders suffered from chronic illnesses. The most prevalent health problems were: (a) cardiovascular diseases (hypertension and peripheral vascular disease), (b) musculoskeletal problems (osteoporosis and arthritis), and (c) vision impairment (blindness, glaucoma, and cataract).

The MMSE scores ranged from 27 to 30 with a mean of 28.5 which indicated that the participants in the study were oriented and capable of learning and making their own decisions. The fall predisposition scale identified the primary variables which contributed to the risk for falls (see Table 2). The fall predisposition scores ranged from 8 to 15 with a mean of 10.73 which indicated that the subjects had a high risk of falling. Approximately 53% of the subjects had an elimination problem, and 60% of them had



impaired vision. All of the participants had gait or balance problems and needed to use devices to assist walking. In addition, all of the participants took two or more medications daily.

The most common environmental hazards found at the first home visit assessment were: (a) lack of slip-resistant colored adhesive tape on step edges, (b) lack of armrests on chairs to provide assistance while transferring, (c) low lying objects presenting a tripping hazard, (d) no non-slip mat by sink area to absorb water, (e) chairs used in kitchens were not equipped with armrests and were not the proper height to allow safe transfer, (f) slippery floor, especially when wet, (g) no night light or bedside lamps, and (h) pathway from the bed to the bathroom was not clear to provide unobstructed mobility (see Table 3).

The mean score for the environmental hazard assessment at the first visit was 8.27 points out of a possible 37 points. A higher score indicated an increased number of environmental hazards. The mean of the second environmental hazard assessment score dropped 2 points to 6.27 by the third visit. According to the dependent samples t-test, there was statistically significant improvement by the third home visit at 99.99% confidence level (see Table 4). This finding indicated that the difference between the scores on the two environmental hazard assessments (obtained from the first and third home visits) did not happen by chance and could be attributed to the nursing educational intervention.

On the third visit, many of the participants had made changes to decrease the environmental hazards. The most common changes after educational nursing intervention were (a) rearranging furniture (100% of the subjects who had the hazard

made a correction), (b) installing night light (100% of subjects who had the hazard made a correction), (c) removing throw rugs (100% of subjects made a correction), and (d) placing non-slip rug in front of sinks (56% of subjects made a correction). In general, the corrections that cost nothing or a little were most likely to be made.

### **Discussion**

This study found that elders who have chronic illnesses or disabilities, especially older women, have a higher level of risk to fall at home than other elders. The changes that could be made at low or no cost, such as rearranging furniture and installing a night-light, were more readily implemented by the participants. This finding pointed out that finance probably played a role in changing living environmental conditions.

The unique part of this study was the one-on-one home visit by the nurse, which provided an intensive and personalized educational intervention. The rapport built between subjects and the investigator during home visits also encouraged participants to participate in self-care and make positive changes to prevent falls. The elders had adequate time to learn the type of home hazards that existed in their homes and the importance of correcting these hazards. Furthermore, they learned how they could make their home environment safer.

The small convenience sample was one limitation of the study. A larger and more randomly selected sample would make the study more representative. In addition, more accurate correlation would be obtained if there were a control group during the experiment. A recommendation for future study is to utilize a true experimental design with larger random samples so findings can be generalized to other populations.

## **Conclusion**

Falls are preventable. Relevant education and small adjustments to a client's home environment may be the only intervention needed for community dwelling elders. By providing education based on their knowledge and professional training, nurses can make great impact on promoting the quality a client's life. This project has shown that nursing educational interventions can assist the elderly to recognize and eliminate home environmental hazards; therefore, the risk of accidental falls can be effectively reduced. As a result, some injuries and deaths among the elderly can be prevented and expensive medical costs can be reduced. The elderly do not have to suffer from fall-related physical and mental consequences. They will be able to maintain the optimum level of well-being and have a more active and functional life in their home.

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**Table 1**

**Sample Characteristics and Common Medical Problems (N=15)**

		%
<b>Sex</b>		
	Female	87
	Male	13
	Widowed	87
<b>Health Problems</b>		
	Cardiovascular	87
	Musculoskeletal	60
	Impaired Vision	60
<b>Age</b>		
	Average	81.8
	Range	65-98

**Table 2****Percentage of Sample with Risk Factors for Falls (N=15)**

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	%
<hr/>	
<b>Age</b>	
80 or more years of age	60
65-79 years of age	40
<b>Elimination</b>	
Incontinent	53
<b>Falling within the past 6 months</b>	14
<b>Visual Impairment</b>	
Cataract, Blindness, & Glaucoma	60
<b>Gait and balance problems</b>	
Wide base of support while walking	73
Loss of balance while standing	40
Decrease of muscular coordination	80
Lurching, swaying, or slapping gait	40
Use of assist devices (e.g., cane or walker)	100
<b>Medications</b>	
Take two or more medications daily	100

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**Table 3****Most Common Environmental Hazards Identified on Home Visit (N=15)**

	%
<b>Exterior</b>	
Step edges not visually marked.	100
<b>Interior</b>	
Lack of slip-resistant colored adhesive tape on step edges.	100
Lack of armrests on chairs to provide assistance while transferring.	60
Low lying objects presenting a tripping hazard.	33
<b>Kitchen</b>	
No non-slip mat by sink area to absorb water.	80
Chairs not equipped with armrest and not offered the proper height to allow safe transfer.	60
<b>Bathroom</b>	
Slippery floors when wet.	60
<b>Bedroom</b>	
No night light or bedside lamps.	47
Pathway from the bed to the bathroom not clear.	53

**Table 4**

**Comparison of Paired Samples Environmental Hazard Scores Between the First  
and the Third Home Visits (N=15)**

	Mean	Standard Deviation	Standard Error Mean	t	df	Significant (2-tailed)
1 <sup>st</sup> visit	8.27	2.28	0.59			
2 <sup>nd</sup> Visit	6.27	2.05	0.53			
Paired Difference	2.00	1.00	0.26	7.746	14	0.000