Falls Among the Elderly Living in High-Rise Apartments

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A study of 64 elderly people living in high-rise apartments found that 37.5 percent reported falling in the previous year. The annual reported fall rate was 625 per 1,000 persons per year. Fifty-eight percent of those who fell received medical treatment. Dizziness and syncope were reported to be the cause of 80 percent of falls. Self-reported poor health status and disability in vision and gait were strongly associated with falling. The sex of the subject, marital status, advanced age, and alcohol and sedative use were less associated with falling.

Investigators have shown that both the aged living at home[1] and the institutionalized elderly[2] fall frequently. Moreover, when a fall occurs, the sequelae may be serious. The estimates of one-year survival rates after a hip fracture range from 50 to 67 percent.[3] For persons over 65 years of age, falls cause more than one half of the deaths due to injury and are the sixth leading cause of death in persons in this age group.[4] Hence, falls constitute a major source of morbidity and mortality for old people.

Studies in diverse populations suggest risk factors for falling include advanced age,[5] being female,[2] being divorced or widowed,[6] acute illness,[7] chronic disability,[8] alcohol use,[9] and barbiturate sedation.[10] To further investigate these and other possible risk factors, this study examined the occurrence of falls among a group of elderly living in a high-rise apartment by focusing on the following questions:

1. What is the rate of falling in this population?
2. What are the major causes of falling?
3. Are age, sex, marital status, and health status associated with falling?
4. What effect does medication or alcohol usage have on rates of falling?

Methods

The population of this study resided in a high-rise, publicly supported apartment for the elderly in Seattle. No meals or housekeeping were provided in the building, and most residents were able to provide self-care, except in a few cases when residents used community services such as chore services or Meals on Wheels. The building was designed to preclude public hazards presumed to be dangerous to the elderly such as steep stairs or slippery surfaces. The residents did not need to use stairs because elevators and ramps were available. Residents provided their own furniture and arranged their apartments as they wished.

During the winter of 1978-1979 the Institute on Aging at the University of Washington interviewed 105 residents of the apartment building. The interview contained 224 items assessing demographic information, health status, medical problems and symptoms, mental health, alcohol

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Table 1. Comparison of Follow-up Study Participants and Nonparticipants on Characteristics Reported in Original Survey (percent)

	Participants (n = 64)	Nonparticipants* (n = 41)
Age (yr)		
Up to 69	11.1	14.6
70-79	46.0	39.0
80 or older	42.9	46.0
Sex		
Female	68.8	70.7
Male	31.2	29.3
Race		
White	90.6	87.8
Nonwhite	9.4	12.2
Marital status		
Married	29.7	9.8
Widowed	51.6	61.0
Divorced or separated	12.5	26.9
Single	6.3	2.4
Comparative health status		
Better than peers	57.1	37.8
Same as peers	34.9	51.4
Worse than peers	7.9	10.8
Mean number of symptoms	4.4	5.1

*Refused, dead, sick, or moved

use, functional limitations, social and family contacts, and use of social services. The results of this survey have been published elsewhere.[11,12]

One year after the Institute on Aging study, the author attempted to reinterview all 105 residents of the high-rise apartment who participated in the original survey. During the follow-up interview respondents were asked about the number of falls in the previous year, the circumstances of the falls, the resultant injuries of the falls, whether the falls required medical treatment, and whether the faller was taking sedatives or antihypertensives when they fell. The individuals' responses to the follow-up survey were linked to the responses to the original survey.

Results

Sixty-four (63 percent) of the 105 residents from whom information was sought in this follow-up study consented to be interviewed. Twenty-six residents refused to be interviewed, and 11 had died since the original survey. Two residents were too ill to participate, and two others had moved. The demographic and health characteristics of participating and nonparticipating residents are compared in Table 1. The nonparticipants tended to have been more ill and more isolated, but this is understandable because the group included those residents who died during the following year.

Twenty-four of the subjects (37.5 percent) reported falling at least once during the previous year. Six subjects reported multiple falls, ranging from two to nine falls. The annual fall rate calculated from these data was 625 reported falls per 1,000 persons, based on a one-year interval and 64 respondents. Fourteen of the fallers (58 percent) received medical treatment.

Among the 24 subjects who fell, 11 reported no injuries; 8 received minor injuries such as abrasion and contusion, 1 had a severe wrist sprain, 2 had fractures (hip, clavicle), and 2 reported concussions.

Dizziness and syncope were the most prevalent stated cause of falling, whereas environmental hazards were the cause of only 15 percent of the

Table 2. Stated Reason for Cause of Fall

	Number of Fallers Reporting (n = 24)	Percent of Fallers	Total Number of Falls (n = 40)	Percent of Falls
Environmental hazard	5	20.8	6	15.0
Trip	1	4.2	1	2.5
Transfer (move from bed to chair, commode)	2	8.3	2	5.0
Dizziness	3	12.3	2	5.0
Syncope	5	20.8	12	30.0
Drop attack	2	8.3	11	27.5
Difficulty with walking	2	8.3	2	5.0
Visual	2	8.3	2	5.0
Unable to state reason	2	8.3	2	5.0

falls reported by this population (Table 2). The only environmental hazard reported by more than one subject was the roadway curb, which caused falls in three subjects.

Table 3 displays the difference between fallers and nonfallers for potential risk factors. The numbers of respondents may be less than the total 24 fallers and 40 nonfallers because not all items were answered on the original questionnaire. None of the associations shown in Table 3 are significantly different at the $P < .05$ level utilizing the chi-square statistic.

Using the number of falls as the unit of measure provides more information about the risk factors for falling. Because of the nonnormal distribution of falls per subject and to prevent undue influence of subjects with the greatest number of falls, the nonparametric Mann-Whitney and Kruskal-Wallis tests are used in this analysis. Only reported poor health ($P = .02$) problems with near vision ($P = .03$) and dizziness ($P = .06$) are strongly associated with falling. A range of demographic variables, symptoms, diagnoses, and mental health complaints are not significantly related to the number of falls at the $P < .05$ or $P < .10$ level.

Discussion

This study documents a rate comparable to the rate of 668 per 1,000 per year reported by Gryfe et al.[2] Falls were significant in the lives of the elderly, with 37 percent having fallen during the previous year. Two thirds of the fallers received medical attention for their falls; one quarter of the fallers had multiple falls.

Poor health status and disability in gait and vision were the best predictors of falling in this study. These findings confirm previous literature, which also implicates the role of disease and disability in geriatric falls. However, unlike other studies this study did not find advanced age, female sex, or widowed or divorced marital status to be significantly associated with increased rates of falling. Previous studies may well have found relationships because those variables may be associated with poor health.

Likewise, no effect of alcohol or medications on falling arise in this study. This report supports the statements of Margulec et al[8] and Gryfe et al[2] that no effect of medications could be found. One would expect that alcohol, sedation, and antihypertensive drugs could influence rates of falling, and these risk factors need to be investigated in larger studies.

Limitations

Using reported falls as a measure may constitute the greatest limitation of this study. Subjects

Table 3. Difference Between Fallers (n = 24) and Nonfallers (n = 40) for Potential Risk Factors for Falling

	Fallers No. (%)	Nonfallers No. (%)
Age (yr)		
60-64	1 (4)	4 (10)
65-69	1 (4)	1 (3)
70-74	7 (29)	7 (18)
75-79	5 (21)	10 (26)
80-84	6 (25)	11 (28)
85-89	3 (13)	4 (10)
90 and over	1 (4)	2 (5)
Marital status		
Married	6 (25)	13 (32)
Widowed	12 (50)	21 (53)
Divorced or separated	4 (17)	4 (10)
Single	2 (8)	2 (5)
Lives alone	19 (79)	27 (68)
Reported poor health status compared with peers		
Worse	4 (17)	1 (2)
Same	8 (33)	14 (35)
Better	12 (50)	25 (63)
Sex		
Male	5 (21)	15 (37)
Female	19 (79)	25 (63)
Symptoms present		
Dizziness	9 (38)	9 (23)
Foot problems	10 (42)	9 (23)
Problems with near vision	7 (29)	5 (13)
Sedatives	6 (25)	6 (15)
Antihypertensives	6 (25)	11 (28)
Drinks per day		
None	14 (58)	25 (66)
1 or 2	9 (38)	10 (26)
More than 2	1 (4)	3 (8)

were asked to remember and report falls during the previous year. Trivial falls may not have been reported. Thus, the total incidence of falls may be underreported, and the percent of falls requiring medical attention may be inflated.

Other limitations include small sample size, attrition, the use of a self-reported health status measure, and a selected population. The small sample size and the attrition resulting from death, illness, and refusal to be reinterviewed may obscure significant relationships that would be more apparent in a larger study. The use of reported health status as a variable representative of health is controversial, though supported by recent literature.[13,14]

The unique characteristics of this population may also limit the generalizability of this study. The residents of the high-rise apartments were chosen as subjects because they had participated in an extensive survey one year previously, making a one-year follow-up of this group relatively simple. This population probably differs from the elderly who live at home in that the residents live in a semiprotected environment. Both groups,

however, are exposed to hazards outside their homes. In fact, a separate study found that the study residents were similar to those elderly residents of the surrounding neighborhood except that the study residents tended to be functionally more capable.[12]

Implications

Two major implications arise from this study. Elderly patients who have disease and disability and thus may see practitioners most are at greatest risk of falling. When practitioners see sick older patients, they should realize that falls may be a significant source of future morbidity and mortality in this group. Investigators have suggested interventions to reduce falls among the aged, though the efficacy of these interventions has not been proven. Special precautions for older patients include removal of known hazards, lighting of stairs, gait training, and exercise training.[15] Steep slopes, unlighted stairs, and such floor obstacles as throw rugs and exposed electrical cords may be especially hazardous and should be corrected. In nursing homes where the more disabled elderly reside, special training and assistance with transfer functions may reduce falling.

A second implication is that falls may be a sign of underlying illness. In this study, 80 percent of the falls occurred in subjects who reported symptoms of illness or disability. Practitioners who see patients who fall should be aware of the wide range of diagnostic possibilities that have been suggested in the literature. Any disease that affects neurological systems of balance and normal locomotion may cause falls. For instance, Parkinson's disease, vestibular dysfunction, and tabes dorsalis may predispose one to falls. Generalized neurological dysfunction due to hypoperfusion from arrhythmia or postural hypotension, drug intoxication, or acute infectious illness may predispose the elderly to fall. Any disability of the organs of locomotion, such as severe arthritis or muscle spasticity, may predispose one to falls. Unfortunately, the relative frequency of these suggested causes has not been rigorously investigated in the noninstitutionalized elderly. Overstall[16] and Rodstein[17] have reviewed the causes of falls.

Conclusions

Falls are frequent occurrences in older persons in this population, with 37.5 percent reporting one or more falls in the previous year. The fall rate reported by subjects was 625 per 1,000 persons per year. One quarter of the subjects who fell had more than one fall during the year. Poor health status was the greatest predictor of falling and alcohol, sedation, and advanced age were not found to be associated with falling.

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