
Patients Presenting to Family Physicians After a Fall: A Report from the Ambulatory Sentinel Practice Network

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Background. Patients who fall present a diagnostic challenge to family physicians. The diagnostic workup of these patients must be thorough enough to detect and treat important causes of the fall yet not subject patients to unnecessary tests. Previous studies have provided only limited guidance for primary care physicians because in general they occurred in settings other than primary care and focused on a single age group.

Methods. The Ambulatory Sentinel Practice Network (ASPN) conducted a 6-month study of primary care patients of all ages presenting after a fall, or with medical problems resulting from a fall. ASPN clinicians collected information about the history, physical examination findings, and follow-up of these patients. Causes of falls were grouped into three categories: external reasons for falling, internal reasons related to gait, and internal reasons unrelated to gait.

Results. Participating clinicians identified 431 patients

who had falls out of the 256,680 seen for any reason during the study period. The patients ranged in age from 1 to 94 years. The rate of falls for patients increased rapidly after age 65 years. Most falls occurred for reasons external to the patient, but internal reasons, both nonlocomotor and locomotor, increased after age 65 years. No nonlocomotor causes for a fall were found in patients younger than 65 years of age. Also, the rate of hospitalization of patients seen for falls was greater in the geriatric age group.

Conclusions. The results highlight the need for further research about falls, particularly those occurring in pediatric and young adult patients. Furthermore, correcting environmental hazards and modifying gait problems in the elderly by increasing lower extremity and truncal strength could decrease the risk of falling.

Key words. Accidental falls; age factors; accidents, home. *J Fam Pract* 1992; 35:43-48.

Determining the causes of falls and preventing their occurrence are important challenges to family physicians. Among all age groups, falls cause 58% of accident-related deaths in the home.¹ Furthermore, among the elderly, falls are the fifth leading cause of death.²

Most studies about falls have examined the geriatric population and have demonstrated increased mortality in the elderly during the 12 months after a fall.³⁻⁷ The prevalence of falls during a 1-year period in selected elderly populations ranges from 30% to 53%, with crude incidence calculations ranging from 3.2 per 1000 per year to 370 per 1000 per year.^{4,8-10} Geriatric patients admitted to a nursing home after a fall have barely a 50% chance of ever being discharged, and only 59% will ever walk again.⁷ In addition, studies have shown that frac-

tures complicate falls in the elderly from 6% to 61% of the time, depending on the study population.^{3,5,11-14}

When evaluating and managing a patient who fell, the primary care physician is faced with a difficult and complex problem. The provider must assess potentially serious underlying medical problems that may be related to the fall, while realizing that many patients have no pathophysiologic reason for falling and should be spared unnecessary tests and examinations.

Several problems with previous studies make it difficult for family physicians to understand the risks, causes, and outcomes of falls occurring in primary care patients. Imprecise terminology and the lack of an accepted definition and classification for falls make comparisons among studies and extrapolations of results difficult.^{15,16} In addition, research has typically focused on a specific component of the problem such as a certain age group or a particular outcome. Risks for falls have been examined within specific populations, such as the elderly, or a subgroup of the elderly defined by the living situa-

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tion. Causes for falls most frequently have been studied by comparing host or internal factors with environmental or external factors. Outcome research about falls has centered on specific consequences, such as hip fractures. None of the US studies used an office-based setting to gather information, and only studies based on emergency room reports have sampled all age groups.^{17,18}

Because of the frequency of the problem, the ominous statistics surrounding falls, and the problems in analyzing previous data, this is an important area for research in primary care. To further investigate this problem, the Ambulatory Sentinel Practice Network (ASPN) conducted a study to collect data about falls among noninstitutionalized primary care patients of all ages.

Methods

ASPN is a voluntary, practice-based primary care research network, consisting of 71 practices (54% rural, 40% solo) and 334 clinicians, 90% of whom are family physicians. ASPN practices care for approximately 350,000 active patients.

Fifty-seven ASPN practices with 253 clinicians collected data for 6 months from April 23, 1990, through October 21, 1990. Eligible study patients included persons of any age seen in the office by one of the participating clinicians. The only inclusion criterion for enrollment into the study was that the patient was seen after a fall or for problems relating to a fall. The visit need not have been the result of the patient's first fall.

Data were obtained through routine office procedures. Clinicians completed a standard ASPN data return card at the time of the visit for all patients who came to the clinic because they had fallen.¹⁹⁻²¹ The questions were forced-choice. Clinicians were allowed to write in other reasons for falls if the available choices were insufficient. The data collected included patient demographic information of age and sex. The history obtained through patient interview included the number of times the patient had fallen during the previous 6 months, whether the fall was caused by tripping, whether the fall occurred during daylight hours, whether it occurred indoors, whether the patient had any visual impairment, and whether there was a loss of consciousness. The physical examination evaluated the patient for decreased muscle strength, weight-bearing joint abnormality, gait disturbance, nystagmus, and postural hypotension. The method of examination was not standardized, but left to the discretion of each clinician. The clinician reported a reason for the fall if one was clearly determined. The possible causes included transient ischemic attack (TIA), cardiac arrhythmia, vasovagal reaction, vertigo, tripping, medication

side effect, and drug or alcohol intoxication. Clinicians established these possible causes through their history taking in face-to-face interviews. The type of follow-up management prescribed served as a measure of the severity of the problem, eg, hospitalization, referral to another physician for any reason, or scheduling a return visit.

Patients were categorized according to the following age groups for comparison: 1 to 5 years, 6 to 12 years, 13 to 18 years, 19 to 40 years, 41 to 65 years, 66 to 80 years, and older than 80 years. These categories were selected as clinically relevant groupings, and no attempt was made to obtain an equal number of patients for each category. Because ASPN practices are required to keep an age and sex registry of their patients, we could estimate the rate of fall-related patient visits to the practices and stratify the number of visits by age.²⁰⁻²²

The physical findings and causes for falls were categorized in three groups: (1) factors external to the patient, such as tripping, (2) factors internal to the patient that related to locomotion, such as muscle weakness or weight-bearing joint abnormality, and (3) other factors internal to the patient, such as a cardiac arrhythmia, neurologic problem, vertigo, or a vasovagal reaction. Statistical comparisons were made among age groups and categories of causes and outcomes using the chi-square test and a $P < .01$ level of significance.

Results

During the 6-month study period, the participating clinicians recorded 256,680 patient visits and enrolled 431 persons who fell. This corresponds to a crude rate of 1.7 falls per 1000 primary care patients seen. Patients who fell ranged in age from 1 to 94 years; the median age was 56 years and standard deviation, 29 years. Sixty-three percent of all patients who made fall-related visits were female, and female patients represented a greater percentage of those who fell in every age group except the two groups aged 1 to 5 and 6 to 12 years. Based on ASPN records, female patients comprise 56% of the network's patient population.

The number of people seen for a fall in each age category is shown in Figure 1. Patients 13 to 18 years of age sustained the fewest falls, whereas the group of patients 66 to 80 years old had the most falls. Fewer than one quarter of the falls were sustained by people under 19 years of age. Figure 2 shows the rate of falls in each age group. The rate represents the number of patients who were seen for a fall per 1000 patients registered in that age category in all the participating practices. The rate of fall-related visits decreases slightly from toddler age to middle age, and then rises steeply after age 40 years.

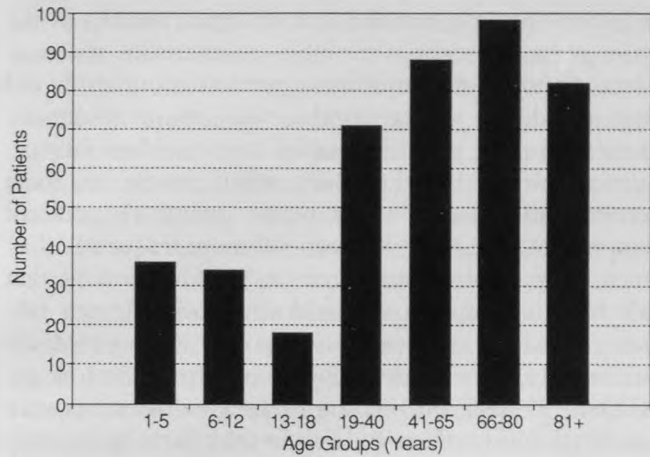


Figure 1. Number of patients seen for falls, by age category.

The historical data collected indicated that 56% of the falls occurred indoors, and 70% occurred during daylight hours. Persons older than 65 years of age fell indoors at a statistically higher rate than that for persons younger than 65 years ($P < .01$). Alcohol or drug abuse was listed as a contributing factor in a fall only 2.3% of the time. Side effects of medications were recorded as a potential contributing cause in only 17 patients (3.3%) who fell. However, of all the persons listed with possible medication side effects, 79% were older than 65 years. The 6.9% of geriatric patients falling because of medication side effects represents a nearly sixfold increase in the rate over patients less than 65 years of age ($P < .01$).

The rate of fall-related visits in each age group by category of cause is presented in Figure 3. External factors contributed to 72% of all falls with known causes.

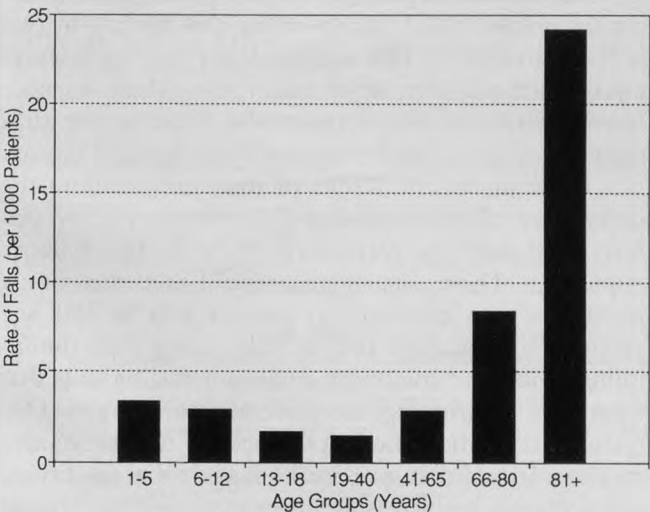


Figure 2. Rate of falls per year, by age category, for patients registered in the practices.

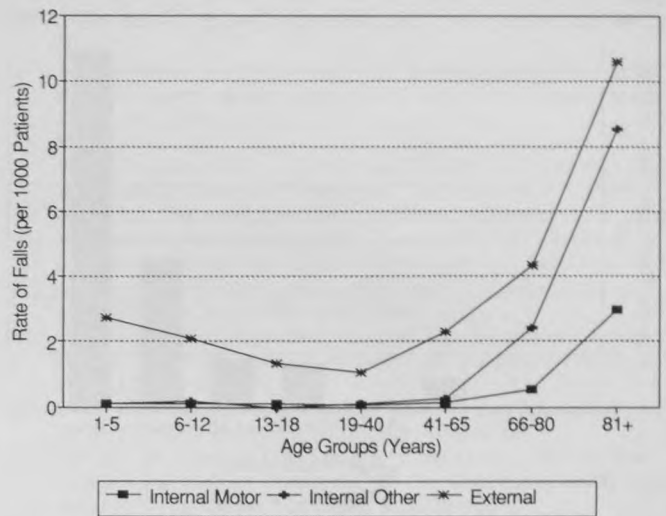


Figure 3. Rate of falls per year, by reason of falling, in each age category.

Tripping represented 83.5% of the external factors. Other recorded external factors included slipping and sports-related accidents. The rate of external reasons for falls decreased until age 40 years and then increased rapidly. Internal reasons for falling, both locomotor and other, were more prevalent with increasing age, especially after 40 years of age. More than 80% of all internal nonmotor reasons for falling occurred in patients older than 65 years of age.

Another way to analyze the three groups of causes for falls is to use as the denominator only patients who fell. Figure 4 presents the percentage of causes for patient falls in each age group. As the figure shows, up until 65

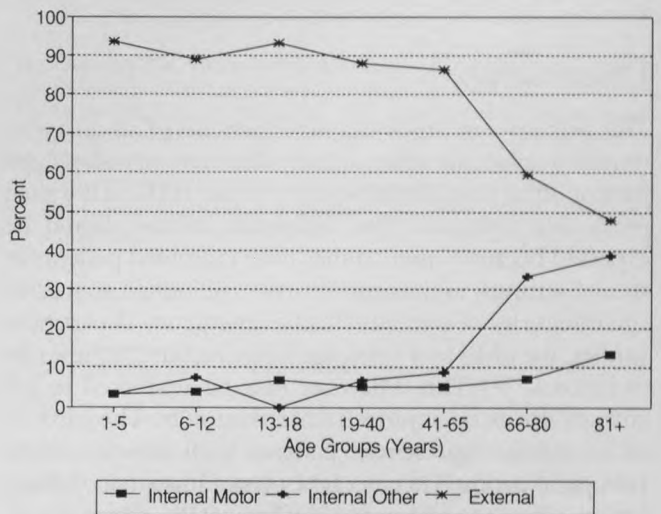


Figure 4. Percent of patients who fell in each age category, by reason for fall.

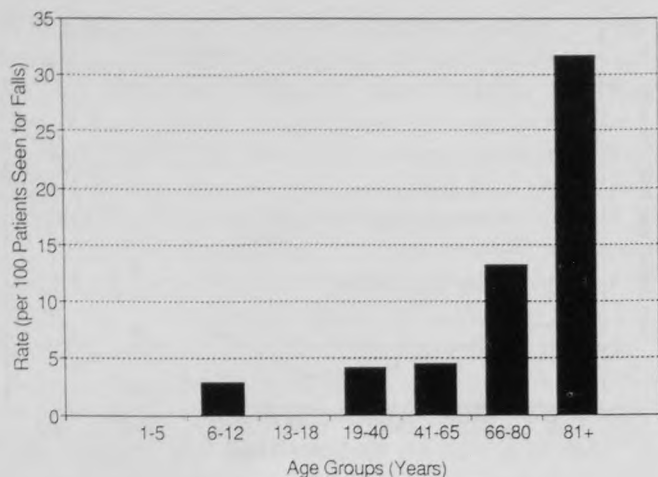


Figure 5. Rate of hospitalization of patients in each age category seen for a fall.

years of age, an overwhelming percentage of patients who fell did so as a result of external reasons. After 65 years of age, internal factors caused falls at a rate approaching external factors. Internal factors only exceeded external ones in patients more than 81 years of age.

As concluded from outcome data, most patients who fell required only one visit. Sixty-seven percent of patients needed no return visit, referral, or hospitalization. The referral or return visit rate for geriatric patients was the same as for younger patients, but both men and women who were older than 65 years of age were hospitalized more frequently ($P < .01$). Figure 5 displays the rate of hospitalization of patients who fell in each age group.

Discussion

This primary care study examines patients of all ages who visited a clinician after a fall. The rate of fall-related patient office visits in this study, 1.7 per 1000, is less than previously reported. The difference in rate should be expected because other studies have examined patients in special settings, and except for two, all looked at specific age categories of patients. In the emergency department studies, the birth to 4 years age range had the highest rate of injuries.^{17,18} This difference may be attributed to the authors' focus on injuries rather than falls. The cases in those studies represented patients with injuries severe enough to prompt an emergency visit rather than waiting for an office appointment. Unfortunately, their investigation does not permit conclusions regarding specific aspects of fall-related visits in the pediatric and young-

adult age groups, and the lack of similar studies in the younger age categories prohibits comparisons with our data. Although the enrollment period for our study did not include the winter months, many of our results are similar to prior geriatric-focused reports. Most falls occurred during daylight hours, when people are most active, and indoors, where people spend a significant amount of time.^{3,23,24} Women fell more frequently than men, as previously suggested.^{3,9,18,25} Our finding that alcohol consumption was seldom associated with falls corresponds to most previous reports.^{4,25} However, clinicians are poor at detecting alcohol problems in patients.²⁶⁻³¹ Also, our finding of an association between medication side effects and falls in the elderly agrees with that of previous authors.^{8,13,24,32,33} We also found that certain risk factors increased in importance with age, a finding detected by other studies. These factors include decreasing visual acuity, postural hypotension, and cardiac arrhythmias.^{10,25,32}

We found that tripping, an external factor, contributed to a higher percentage of falls in our study than reported in other studies.⁸ We also found a greater association between mobility problems and falls as people age.^{24,32,34} This information confirms what many researchers have previously noted.^{5,8,11,13,32,34-36} They described these mobility problems as hip weakness, poor balance, lower extremity disability, foot problems, abnormal gait or balance, difficulty standing or walking without assistance, arthritis, or simply as "decreased" mobility. We believe that these descriptors correspond to the mobility problems that we found in our study. Given the freedom allowed the individual clinicians in performing the physical examinations, however, variation in assessment undoubtedly occurred.

Age correlated positively with the rate of hospitalization in our study, corroborating that finding in two previous studies.^{3,18} This suggests that either more severe injuries occur as a result of falls in the elderly or more serious medical problems cause falls in the elderly, thus requiring diagnosis and treatment in the hospital setting.

In summary, the results of this study reaffirm the importance of understanding falls experienced by primary care patients, particularly those in the geriatric population. These data suggest several ways that family physicians may intervene to prevent falls in this age group. Addressing the risks of falls arising from diminishing vision and correcting environmental hazards that contribute to tripping are currently encouraged. Our findings confirmed the importance of this preventive measure. In addition, our results suggest that modifying gait problems by increasing lower extremity and truncal strength, and increasing joint flexibility may decrease the risk of falling. Whether these interventions will decrease

the number of falls will become clearer with further research.

The results also suggest that less emphasis should be placed on evaluating medical diseases such as cardiac arrhythmias and TIAs in patients who are less than 65 years of age. In addition, although few falls were attributed to medication side effects, we must periodically evaluate and reaffirm the need for each medication prescribed for a patient, particularly for elderly patients.

Findings from this study suggest several areas for further research. The impact of medication and drug and alcohol use on the rate of falls requires more investigation, as does the occupational and social background of patients who fall. More detailed knowledge about patient outcomes, including the results of interventions, is needed. Because the methodology of our study did not produce more specific information about the falls incurred by younger people, a study focused on this age group could reveal substantial new data. Finally, these results indicate the need to assess the training that residents and medical students receive about appropriate prevention and management protocols for falls.

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