



# Falls in elderly patients: Predictable and preventable

**ROBERT PALMER, MD, MPH**

Head, Section of Geriatric Medicine, Department of General Internal Medicine, Cleveland Clinic

## ABSTRACT

Accidental falls are a preventable cause of serious injuries and death in the elderly. Recent studies have identified a number of risk factors for falls, including sedative use, cognitive impairment, lower extremity weakness, and impaired vision. Office evaluation that focuses on finding the cause helps to identify what interventions are needed to prevent recurrent falls.

**F**ALLS IN THE ELDERLY are not random occurrences caused solely by bad luck. Rather, they are predictable. And what can be predicted can often be prevented. Usually the cause of a fall—and what interventions will help prevent future falls—can be determined during an office evaluation.

Every year, falls occur in about one third of community-dwelling persons over the age of 65, and in about 50% of persons age 80 and older.<sup>1</sup> After every fall, an elderly patient is at an increased risk of hospitalization, nursing home placement, and death.

## RISK FACTORS FOR FALLS

An accidental, nonsyncopal fall may be defined as “unintentionally coming to rest on the ground, floor, or other lower level.”<sup>2</sup>

Prospective studies published within the last 12 years have identified risk factors predictive of falls in older persons.<sup>1,3–7</sup> They include:

- Sedative use
- Cognitive impairment
- Abnormalities of balance and gait
- Disability of the lower extremities
- Foot problems
- Low gait speed
- Difficulty performing tandem gait
- Impaired vision
- Small calf circumference
- Low body mass index (ie, being underweight)
- Incontinence
- Depression.

Furthermore, about a third of those who fall develop a fear of falling that not only is predictive of an increased risk of falling but also of a decline in ability to perform self-care.

## WHY OLDER PEOPLE FALL

To maintain balance and gait, the sensory (afferent), central (brain, spinal cord), and musculoskeletal systems must work together in synchrony. However, the effects of aging and chronic disease (eg, peripheral neuropathy, dementia, and arthritis) may compromise one or all of these systems and predispose a person to falls.

The aging process seems to increase the risk of a fall in other ways as well. Older patients experience an increase in postural sway and a reduction of their adaptive reflexes (eg, the ability to stretch out an arm and catch yourself before you actually fall). Postural stability also seems to diminish with age. The less stable the body is, the more likely it is to fall.

Over time, debilitating illnesses can cause the body to become weak. Weakness from deconditioning, atrophy, and stroke are common causes of falls. In particular, weakness of

**Clinical trials  
support  
multifactorial  
interventions  
to prevent falls**

TABLE 1

**Office-based evaluation of falls****History**

Circumstances before and after fall, type of fall (slip, trip, etc)  
 Accompanying symptoms  
 Prior history of falls  
 Gait impairment or balance disturbance  
 Fear of falling  
 Symptoms of depression

**Medication review**

Psychotropics\*  
 Vasodilators†  
     Alpha-blockers  
     Nitrates

**Physical examination**

Orthostatic blood pressure  
 Distance vision  
 Elementary neurologic exam  
 Lower extremity musculoskeletal examination (evaluate the knees, quadriceps, and hip and ankle muscles for range of movement, strength, and stability)

**Cognitive screen**

Mini-mental state examination

**Performance-based evaluation**

"Get-up-and-go" test (rise from chair, walk 10 feet, turn around, walk back to chair, and sit down)  
 Romberg test  
     Turn head, look up, reach, bend  
 Resist sternal nudge  
 Ability to walk while talking

\*These drugs are associated with falls

†These drugs may be associated with falls

ADAPTED FROM MAHONEY JE. FALLS IN THE ELDERLY: OFFICE-BASED EVALUATION, PREVENTION, AND TREATMENT. CLEVE CLIN J MED 1999; 66:181-189.

the lower extremity muscles, which is often associated with deconditioning, impairs gait and predisposes a person to falling, especially when combined with a minor clinical perturbation, such as an acute infection. The risk of falls increases with the number of chronic illnesses.

Diuretic use, which is common in the elderly, can reduce blood pressure, particularly in a patient who is already a bit unsteady, and can lead to a fall.

Dizziness, delirium, or dementia, which are also common, can also lead to falls.

Simple slips or trips are the most common nonphysiologic cause of falls in the community-dwelling elderly population.<sup>8</sup> These falls are usually associated with environmental hazards such as slippery rugs, a cluttered living space, and poor lighting.

## OFFICE-BASED DIAGNOSTIC EVALUATION

**Syncopal or nonsyncopal?**

When evaluating an elderly patient with a history of falls, begin the discussion by asking the patient to describe the circumstances. This will help you determine if the fall was syncopal or nonsyncopal. If syncope is the likely culprit, a cardiac workup may be necessary. If the fall was nonsyncopal, follow the office evaluation outlined in TABLE 1.

**'Get-up-and-go' test**

Observing the patient's balance and gait is perhaps the most useful aspect of the office-based evaluation. The timed "get-up-and-go" test<sup>9</sup> is particularly useful and appears to predict falls. The test requires a patient to stand up, walk 10 feet, turn, walk back, and sit down. Fully functional older adults should be able to complete this task in less than 20 seconds. Postural instability, lower extremity weakness, reduced stepage (eg, short, unsteady steps), increased lateral sway, stride variability, and ataxia can easily be identified during this test.

**Further evaluation**

If the causes of the fall remain unclear, and if falls occur only at home, consider a home safety evaluation.

An extensive diagnostic workup is not warranted in nonsyncopal falls. Any further testing should be based on the circumstances surrounding the fall and findings from the history and physical examination. For example, in the emergency evaluation of an elderly patient who has fallen, a history of head trauma plus focal neurologic deficits suggests the need for a neuroimaging procedure, such as a computed tomography scan of the head.





## ■ WHAT INTERVENTIONS CAN HELP PREVENT FALLS?

Obvious causes of falls such as poor vision can be treated quickly. Other interventions that can help prevent falls include:

- Exercise classes to improve strength, endurance, and balance (eg, tai chi)<sup>2,10,11</sup>
- Home safety inspections with simple home modifications (eg, installation of handrails in stairwells, nonslip floor surfaces, and raised toilet seats)<sup>12</sup>
- Education about the appropriate use of sedative-hypnotic agents
- Gait retraining (patient learns to walk properly or to use assistive devices such as walkers and canes)<sup>13</sup>
- Elimination of psychoactive drugs when possible.<sup>14</sup>

Patients with generalized weakness (eg, from deconditioning) will benefit from a physical therapist consult, with orders for gait assessment and low-intensity resistive exercises of the lower extremities, including the hip and knee extensors.

### Studies show that more than one intervention should be used

Recent clinical trials support the use of multifactorial interventions directed at optimizing the patient's sensory, central, and musculoskeletal systems. Most studies have found that no matter what interventions are used, they need to be sustained over time. Otherwise, the benefits will be lost.

**Tinetti et al**<sup>13</sup> randomized 301 community-dwelling men and women age 70 and older with at least one risk factor for falling to receive either a combination of medication adjustment, behavioral instruction, and an exercise program (n=153) or usual care plus social visits (n=148) for 3 months. At 1 year follow-up, the researchers found that 35% of the intervention group had fallen compared with 47% in the non-intervention group—a 26% reduction. The adjusted incidence rate ratio was 0.69, meaning that the intervention group was 31% less likely to fall.

**Wagner et al**<sup>15</sup> randomized 1,559 community-dwelling men and women age 65 and older to receive one of three regimens: a nurse assessment visit and follow-up interventions

targeting risk factors for disability and falls (n=635); a general health promotion nurse visit (n=317); or usual care (n=607). At 1 year, 27.5% of patients in the full-intervention group had reported falling, compared to 29.6% of the patients in the nurse visit-only group and 36.8% of the usual care group. This translates into a 25% reduction in falls between the full intervention and usual care groups.

**Ray et al**<sup>16</sup> selected 221 nursing home residents at high risk of falling, assigned them to a comprehensive fall prevention program, and compared them with a control group of high-risk patients. The program consisted of a multidisciplinary individual patient assessment that targeted environmental and personal safety hazards (eg, floor surfaces, lighting, and bathroom equipment) and psychotropic drug use. In addition, all wheelchairs were assessed for problems (eg, missing foot and leg rests) and staff were taught how to use safer transferring techniques. The mean proportion of recurrent fallers in the 7 facilities that used the intervention was 19.1% lower than that in the 7 control facilities (n=261).

In a study by **Close et al**<sup>17</sup>, 184 community-dwelling patients age 65 and older who had presented to an emergency department after a fall underwent a detailed medical assessment (visual acuity, balance, cognition, affect, prescriptions) and occupational therapy assessment in which physical function and home safety issues were assessed and addressed. After 1 year, the total number of self-reported falls in the intervention group was 183 vs 510 in the control group (n=213). In addition, patients in the intervention group had a lower risk of falling and a lower risk of recurrent falls.

A study by **Rubenstein et al**<sup>18</sup> featured 59 community-dwelling men (mean age 74 years) with risk factors for falls. Thirty-one of the men were randomly assigned to a 12-week exercise program and 28 were assigned to a control group. The exercise sessions, lasting 90 minutes three times per week, were designed to increase strength and endurance and improve mobility and balance. At 3 months, the exercise program did not have a statistically significant effect on hip or ankle strength, balance, self-reported physical functioning, or number of falls.

**First, determine if the fall was syncopal or nonsyncopal**





However, the 3-month fall rate was lower in the exercisers (6 falls/1000 hours of activity) than in the control group (16.2 falls/1000 hours) when the fall rates were adjusted by activity level.

## SUMMARY

When evaluating an elderly patient with a history of falls, begin with a discussion of the circumstances surrounding the falls. Determine if the fall was syncopal or nonsyncopal. If nonsyncopal, review the patient's

medications, perform a test of mobility such as the get-up-and-go test, and evaluate the patient's joints for range of movement, strength, and stability. If the cause of the fall remains unclear and if the falls occur only at home, consider a home safety evaluation or refer the patient to a physical therapist for gait assessment. Patients who have generalized weakness (eg, from deconditioning) will benefit from a physical therapy consult. Treat comorbid conditions that increase the risk of injurious falls, notably osteoporosis, drug intoxication, and low body mass index.

## REFERENCES

1. Tinetti ME, Williams CS. Falls, injuries due to falls, and the risk of admission to a nursing home. *N Engl J Med* 1997; 337:1279-1284.
2. Campbell AJ, Robertson MC, Gardner MM, Norton RN, Tilyard MW, Buchner DM. Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women. *BMJ* 1997; 315:1065-1069.
3. Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. *N Engl J Med* 1988; 319:1701-1707.
4. Tinetti ME, Doucette J, Claus E, Marottoli R. Risk factors for serious injury during falling by older persons in the community. *J Am Geriatr Soc* 1995; 43:1214-1221.
5. Cummings SR, Nevitt MC, Browner WS, et al. Risk factors for hip fractures in white women. *N Engl J Med* 1995; 332:1279-1284.
6. Dargent-Molina P, Favier F, Grandjean H, et al. Fall-related factors and risk of hip fracture: the EPIDOS prospective study. *Lancet* 1996; 348:145-149.
7. Whooley MA, Kip KE, Cauley JA, Ensrud KE, Nevitt MC, Browner WS. Depression, falls, and risk of fracture in older women. *Arch Intern Med* 1999; 159:484-490.
8. Coogler CE, Wolf SL. Falls. In: Hazzard WR, Blass JP, Ettinger WH, et al, editors. *Principles of geriatric medicine and gerontology* (4th ed). New York, NY: McGraw-Hill, 1999; 1535-1546.
9. Podsiadlo D, Richardson S. The timed "up & go": a test of basic functional mobility for frail elderly persons. *J Am Geriatr Soc* 1991; 39:142-148.
10. Lord SR, Ward JA, Williams P, Strudwick M. The effect of a 12-month exercise trial on balance, strength, and falls in older women: a randomized controlled trial. *J Am Geriatr Soc* 1995; 43:1198-1206.
11. Wolf SL, Barnhart HX, Kutner NG, et al. Reducing frailty and falls in older persons: an investigation of tai chi and computerized balance training. *J Am Geriatr Soc* 1996; 44:489-497.
12. Thompson PG. Preventing falls in the elderly at home: a community-based program. *Med J Aus* 1996; 164:530-532.
13. Tinetti M, Baker DI, McAvay G, et al. A multifactorial intervention to reduce the risk of falling among elderly people living in the community. *N Engl J Med* 1994; 331:821-827.
14. Campbell AJ, Robertson MC, Gardner MM, Norton RN, Buchner DM. Psychotropic medication withdrawal and a home-based exercise program to prevent falls: a randomized, controlled trial. *J Am Geriatr Soc* 1999; 47:850-853.
15. Wagner EH, LaCroix AZ, Grothaus L, et al. Preventing disability and falls in older adults: A population-based randomized trial. *Am J Public Health* 1994; 84:1800-1806.
16. Ray WA, Taylor JA, Meador KG, et al. A randomized trial of a consulting service to reduce falls in nursing homes. *JAMA* 1997; 278:557-562.
17. Close J, Ellis M, Hooper R, Glucksman E, Jackson S, Swift C. Prevention of falls in the elderly trial (PROFET): a randomized controlled trial. *Lancet* 1999; 353:93-97.
18. Rubenstein LZ, Josephson KR, Trueblood PR, et al. Effects of a group exercise program on strength, mobility, and falls among fall-prone elderly men. *J Gerontol A Biol Sci Med Sci* 2000; 55:M317-M321.

ADDRESS: Robert Palmer, MD, MPH, Department of Internal Medicine, A91, The Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44195; e-mail [palmer@ccf.org](mailto:palmer@ccf.org).

Time the patient in a 'get-up-and-go' test

CLEVELAND CLINIC CENTER FOR CONTINUING EDUCATION

[www.clevelandclinicmeded.com](http://www.clevelandclinicmeded.com)