

Stepping Up to Prevent Falls

The ascent of the podiatric profession within the medical community has been phenomenal over the last decade. There was a time when podiatric medicine and peripheral arterial disease (PAD) were seldom mentioned in the same sentence. Diagnostic ultrasound and digital X-ray were foreign concepts. Epidermal nerve fiber density testing wasn't even in our vocabulary.

The profession has made incredible strides in leading the medical community in diabetic foot salvage through research, analysis, and implementation of advanced treatment tools and protocols.

Podiatric medicine now stands ready to tackle another disturbing paradigm that has an increasingly profound impact on our patient population but has largely been ignored.

The risk of falls in our aging population is just as critical and as easy to detect as PAD. When we first began to discuss PAD in our lecture halls and journals, many rejected the idea of testing for PAD as outside our scope of training or damaging to our referral relationships with vascular specialists. The same has erroneously been said of our role in addressing other issues, including fall prevention.

The truth of the matter is that, like PAD, falls are a silent killer that many simply don't know how to address. Podiatrists can assess and diagnose fall injuries and can also provide important fall prevention tools.

However, before we as a profession can take fall prevention seriously, we need to understand the effect falls have on our patients, why people fall, and what we can do about it.

The Data

One out of three adults age 65 and older falls each year.^{1,2} In 2007, more than 18,000 older adults died from fall injuries, and among those age 65 and older, falls are the leading cause of injury death.

Falls are also the most common cause of nonfatal injuries and hospital admissions for trauma. In 2009, 2.2 million nonfatal fall injuries among older adults were treated in emergency departments and more than 581,000 of these patients were hospitalized.³

In 2000, direct medical costs of falls were \$179 million for fatal falls and \$19 billion for nonfatal fall injuries.⁴

Many people who fall, even if they are not injured, develop a fear of falling that often causes them to limit their activities, leading to reduced mobility and loss of physical fitness, which in turn increases the actual risk of falling.⁵

Because the risk of falling is not related to a single disease, clinicians may not recognize falling as a treatable health prob-

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By Jonathan Moore, DPM, MS

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lem. The consequences of untreated falls and risk factors can be just as serious as those of other untreated chronic diseases.

The risk of falling correlates to the number of risk factors an older person has for falling. Risk factors include intrinsic factors like neuropathy, ankle instability, and weakness, along with other specific acute and chronic diseases that can affect sensory and musculoskeletal systems. Extrinsic factors such as environmental hazards, obstacles, and medication side effects play a significant role in falls.⁶ The frequency of falling has been described as an accumulated effect of multiple disorders superimposed on age-related changes.^{7, 8}

Fall Risk Assessment for the Podiatric Physician

While many intervention strategies have been implemented with different target populations and varied settings, statistics show that few clinicians put practical strategies in place within their practice.⁹ However, podiatrists can help to modify several risk factors identified in **TABLE 1**.

Any intervention strategy must start with an objective fall risk assessment. The author, with the assistance of a certified fall prevention occupational therapist, has created an easy-to-perform fall risk-assessment tool that combines many of the published fall risk-assessment tools used by therapists. See **TABLE 2** on page 14.

TABLE 1
Risk Factors for Falling^{8, 9}

Demographic Factors

- Older age (especially ≥ 75 years)
- White race
- Housebound status
- Living alone

Historical Factors

- Use of cane or walker
- Previous falls
- Acute illness
- Chronic conditions, especially neuromuscular disorders, stroke, drop foot*
- Medications, especially the use of four or more prescription drugs

Physical Deficits

- Cognitive impairment
- Reduced vision, including age-related changes (e.g., decline in visual acuity, decline in accommodative capacity, glare intolerance, altered depth perception, presbyopia, decreased night vision, decline in peripheral vision)

Physical Deficits, *continued*

- Difficulty rising from a chair (weakness)
- Ankle instability (increased postural sway)*
- Foot problems*
- Neurologic changes*, including age-related changes (e.g., postural instability; slowed reaction time; diminished sensory awareness for light touch, vibration, and temperature; decline of central integration of visual, vestibular, and proprioceptive senses)
- Decreased hearing, including age-related changes (e.g., presbycusis [increase in pure tone threshold, predominantly high frequency], impaired speech discrimination, excessive cerumen accumulation)
- Others

Environmental Hazards

- Footwear*
- Application and use of ancillary fall prevention devices *

* Risk factors of particular relevance for podiatrists.

This assessment tool includes standardized tests, as well as history components that have been standardized as key factors involved in falls. The tool allows a physician to calculate risk based on a point system. A point value of 10 or higher indicates high risk for falling, while a point value over 20 indicates imminent risk for falling.

Among the factors with the highest predictive value for fall risk is the patient's history of falls within the last year. Although studies differ on the number of falls indicative of the highest risk, I assigned a high value (eight points) for those who had three or more falls within the past year.

One of the easiest indicators and the most frequently used tools as reported in the medical literature is an assessment called the timed "Up and Go" test. This timed test measures, in seconds, the time taken by an individual to

Individuals with an average score of 10 seconds or less on the timed "Up and Go" test are freely mobile and considered to have a low risk of future falls. Patients with an average score of 11 to 19 seconds are generally considered independently mobile and have a moderate risk of future falls and thus should be treated and educated. Individuals with an average score of 20 to 29 seconds have variable mobility and are considered to have a moderate to high risk of future falls. Those with an average score of 30 seconds or greater have variable mobility and are considered to have a high risk of future falls.

While the timed "Up and Go" test is an excellent fall assessment tool, it can be replaced by an easier, faster test involving simple visual assessment of the patient's ability to rise smoothly from a chair.

THE RISK OF FALLING CORRELATES TO THE NUMBER OF RISK FACTORS

an older person has for falling. Risk factors include intrinsic factors like neuropathy, ankle instability, and weakness, along with other specific acute and chronic diseases that can affect sensory and musculoskeletal systems.

stand up from a standard armchair (approximate seat height of 46 cm [18 in] and arm height 65 cm [25.6 in]), walk a distance of approximately 10 feet, turn, walk back to the chair, and sit down. The patient wears his or her regular footwear and uses any walking aid (cane, walker) he or she customarily uses. No physical assistance is given. The patient starts with his or her back against the chair, arms resting on the armrests, and walking aid at hand. On the word "go," the patient gets up and walks at a comfortable and safe pace to a line on the floor 10 feet away, turns, returns to the chair, and sits down again. To become familiar with the test, the patient walks through the test once before being timed. Either a stopwatch or a wristwatch with a second hand can be used for timing. It was reported in 2005 that the timed "Up and Go" (>15 seconds) is as accurate at predicting a future fall as the more complex Berg Score, Tinetti Scale, and the even more complex Physiological Profile Assessment (PPA).^{10, 11}

In the fall assessment tool used by the author, a scale applies a score based upon the patient's ability to rise smoothly from a sitting position. The patient's ability to rise from a chair with one attempt (pushing up) with no loss of balance or additional steps is worth 2 points, while a patient requiring multiple attempts to rise receives 4 points. A patient who is unable to rise at all without assistance demonstrates significant weakness and instability.

Another simple tool included in the fall assessment created by the author is a simple observational test called the "Walk and Talk" test. This easy-to-perform test has been held to be a highly sensitive assessment for fall risk. The test evaluates the patient's ability to divide attention between multiple tasks: walking and talking.

As the patient walks to the treatment room, the clinician initiates conversation with the patient (the clinician continues

TABLE 2
Risk Assessment Tool

PARAMETER	SCORE	PATIENT STATUS/CONDITION
A. Vestibular (Dizziness)	0	No complaints of dizziness
	2	Intermittent complaints of dizziness
	4	Dizziness that interferes with ADLs
B. History of Falls (past 12 months)	0	No falls
	2	One to two falls or near falls
	9	Three or more falls or near falls
C. Demographics	1	Female
	2	Female > 65 years
D. Vision Status	0	Adequate (w/ or w/o glasses)
	2	Poor (w/ or w/o glasses)
	4	Legally blind
E. Gait and Balance	—	Have patient stand on both feet w/o any type of assistance, then have him or her walk: forward, through a doorway, then make a turn. (Mark all that apply.)
	0	Normal/safe gait and balance
	1	Balance problem while standing
	1	Balance problem while walking
	1	Decreased muscular coordination
	1	Change in gait pattern when walking through doorway
	1	Jerking or unstable when making turns
	1	Requires assistance (person, furniture/walls, or device)
F. Ankle Strength/Range of Motion	0	Normal ankle strength and range of motion within normal limits
	2	Moderate limitation of ankle joint range of motion and strength
	4	Significant ankle joint instability and weakness
G. Medications	—	Based upon the following types of medications: anesthetics, antihistamines, cathartics, diuretics, antihypertensives, antiseizure, benzodiazepines, hypoglycemics, psychotropics, sedative/hypnotics.
	0	None of these medications taken currently or w/in past seven days
	2	Takes 1-2 of these medications currently or w/in past seven days
	4	Takes 3-4 of these medications currently or w/in past seven days
	1	Mark additional point if patient has had a change in these medications or doses in past five days.
H. Predisposing Diseases	—	Based upon the following conditions: neuropathy, hypertension, vertigo, CVA, Parkinson's Disease, loss of limb(s), seizures, arthritis, osteoporosis fractures. (MO210, MO230, MO240)
	0	None present
	2	One to two present
	4	Three or more present
I. Get Up and Go	0	Able to rise in a single motion (no loss of balance with steps)
	2	Pushes up, successful in one attempt
	4	Multiple attempts to get up, but successful
J. Walk and Talk	5	Inability to maintain normal gait pattern while walking
	8	Must stop walking in order to speak

70 TOTAL POINTS A score of 10 or more indicates high risk for falls.

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walking). Record a “positive” score if the patient has to stop to respond to a question in the conversation and a “negative” score for someone who is able to continue walking. Tiedmann noted that this test was one of the most sensitive for fall risk.¹² According to the fall assessment tool used by the author, a positive “Walk and Talk” test is worth 8 points.

reviewing the medications taken by a patient who falls. The fall assessment guide places a value of four points for those who are taking three or more medications listed that predispose them for falls. Vision status, predisposing diseases, and a simple observational gait assessment are additional elements included in the author’s fall assessment tool.

Almost all of the fall assessment components can be completed within the first several minutes of the patient’s office

ANOTHER CRITICAL ELEMENT OF THE TARGETED HISTORY

for those at risk for falls includes consideration of
the patient’s medications, including prescription,
over-the-counter, herbal, and illicit drugs.

Evidence demonstrates a gradual decline in balance abilities and gait speed with age, but many factors can make a patient’s risk for falls much more likely.

Another critical element of the targeted history for those at risk for falls includes consideration of the patient’s medications, including prescription, over-the-counter, herbal, and illicit drugs. Red flags are polypharmacy (four or more prescription medications), or the initiation of a new drug therapy in the previous two weeks. A list of higher-risk medication types are provided for reference on the fall assessment tool.

Physicians must maintain a high index of suspicion when

visit by a medical assistant trained to observe and document findings as listed.

Additional clinical elements, including the ankle strength and range of motion section, the gait and balance section, and the “Up and Go” test can be accomplished in minutes by the physician.

Needless to say, the assessment is where it all begins. In part two, I address a clinical plan for patients found to be at high risk for future falls. Watch for the second installment in the July/August issue of *APMA News*. ■

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Stepping Up to Prevent Falls: Part II

BY JONATHAN MOORE, DPM

EDITOR'S NOTE: In the June issue of APMA News, you read about the impact of falls on America's elderly and how podiatrists can play a role in assessing the risk of falls among their patients. In this issue, learn more about what you can do for patients you've identified as being at high risk for falls.

APMA does not endorse any specific ankle-foot orthoses (AFOs) for the prevention of falls. You should carefully evaluate patients with ankle instability to determine the potential benefit of an AFO. Further studies of AFOs and their effect on fall prevention are needed. APMA News invites diverse clinical perspectives from members.

Once you have conducted an objective assessment of a patient's risk of falling (see assessment tool in the June 2011 issue of *APMA News*), you can implement a plan that includes a variety of interventions to mitigate that risk. Some common interventions include:

- physical activity-based interventions (physical/occupational therapy);
- assessment of ankle and foot joint weakness and instability;
- treatment to address instability and improve postural sway for those with loss of sensation/proprioception;
- assistive devices to improve balance, reduce instability, and improve proprioception (e.g., an AFO designed to improve balance, proper foot wear, and possible treatment for neuropathy);
- assessment for referrals to ophthalmology or for treatment of vestibular disorders that may be affecting balance;
- education (a patient checklist of methods to prevent falls); and
- assessment and treatment of common foot ailments (e.g., corns, calluses) linked to imbalance and fall risk.

Podiatrists routinely recommend all of the interventions above, yet we seldom “package” them for the patient at risk for falling. This article addresses several of these areas in greater depth.

Referral for Physical or Occupational Therapy

Ankle instability is a key component of fall risk, and ankle range of motion/instability is among the measures in the fall risk-assessment tool in the June issue. Four points are assigned from the presence of significant weakness or loss of range of motion of the ankle joint.

In a recent study, researchers compared participants who reported falling to those who did not. Compared to

those who did not fall, fallers exhibited decreased ankle flexibility, more severe hallux valgus deformity, decreased plantar tactile sensitivity, and decreased toe plantarflexor strength. Subjects who fell were also more likely to have disabling foot pain. Discriminant function analysis revealed that decreased toe plantarflexor strength and disabling foot pain were significantly and independently associated with falls after accounting for physiological fall risk factors and age.¹

Your referral, along with implementation of the right shoe and assistive device, can have an enormous effect on the incidence of falls.

A gradual decline in balance abilities and speed of gait occurs with age. These two areas are linked directly with activity level. Weakness in the anterior tibialis muscle, which dorsiflexes the ankle and toes to clear the toes during walking, is common in seniors, which is why many falls every year are attributed to lower extremity weakness, instability, and often poor footwear, which contributes to stumbling and tripping. With age, the tibialis muscle (among others) can get “out of sync” in its timing with other muscles in the leg. As a result, the timing of toe clearance is altered, and the toe may catch on the floor.

Treating the fall-risk patient must always include a referral to physical/occupational therapy to facilitate a plan of care that includes strength and balance training. Your referral, along with implementation of the right shoe and assistive device, can have an enormous effect on the incidence of falls.

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Common Podiatric Conditions

A significant correlation exists between complaints of foot and ankle pain in the senior patient and the incidence of falls.

More than 75 percent of older adults have foot pain. Foot pain is caused by, but not limited to, thin heel pads, corns, bunions, dry and cracked skin, ingrown or overgrown toenails, and sores. Foot pain can cause a change in the biomechanics or alignment of the body, thereby increasing the risk for falls.

Podiatrists must realize that simple deformities and areas of pain can impair balance and result in a fall if not addressed in a proper and timely fashion. Many conditions that result in pain within the senior population can be solved with the introduction of good, lightweight footwear.

Postural Control

Postural control can be described as the ability of a person to maintain his or her center of gravity over the legs, ankles, and feet. When there is a defect in the mechanism of postural control (neuropathy, instability, or weakness of the ankles), the patient is much more likely to fall.

Many seniors lack some sensory inputs due to deteriorating vision, neuropathy, or vestibular/balance problems. When sensory information is missing or altered, the brain gathers other sensory inputs in an attempt to maintain postural control.

The ability to maintain a stable upright posture is an important factor involving the somatosensory system, not only in the initiation and control of voluntary movement, but also in the prevention of injury. Decreased postural control or increased postural sway can occur because of ankle instability and loss of normal sensation.^{2,3}

Many seniors lack some sensory inputs due to deteriorating vision, neuropathy, or vestibular/balance problems. When sen-

Key Features of a Balance AFO

1. Easy to put on, with no laces or latches; Velcro latching
2. Lightweight
3. Posterior leaf design to aid in toe clearance
4. Custom-made to maximize somatosensory feedback
5. Eliminates abnormal mechanics (frontal plane ankle motion) while allowing some ankle joint dorsiflexion to aid in smooth gait
6. Some, but not too much, cushion on the foot plate for comfort (avoiding a hard shell feel)
7. Padded tongue to prevent rubbing/friction where the ankle is allowed to dorsiflex and plantarflex
8. Correction for varus/valgus instability in manufacturing

sory information is missing or altered, the brain gathers other sensory inputs in an attempt to maintain postural control.

The use of an AFO has been reported in numerous studies to improve postural control in patients standing on one foot or both feet.^{4,5} An AFO naturally stimulates cutaneous (skin) mechanoreceptors. The sensory information provided by the pressure contact of the material on the skin leads to additional nervous information sent to the brain and central processing center. This input enables the AFO to become another source of sensory information, thus improving balance under conditions in which other sensory cues are eliminated.

The AFO stabilizes the foot/ankle even in the absence of visual information by increasing sensorimotor function offered by the ankle and foot support while controlling ankle movement. Naturally, an AFO will be important when ankle/foot fatigue exists. While foot orthoses alone have been characterized as devices that increase sensorimotor function of the foot, ankle control and sensorimotor feedback around the ankle are even more paramount in addressing risk for falls.

Two years ago, I began to employ an AFO for those at risk for falls, but finding a product with the right design for seniors was difficult. Many products were simply too cumbersome for the elderly to put on, and many restricted motion excessively around the ankle, making it even harder to walk. After multiple attempts to modify existing AFO styles, I documented key characteristics of a balance AFO to reduce falls and designed my own product. (See sidebar above.)

The results of nearly a year of trial and error resulted in development of the Moore Balance Brace (MBB). The MBB has been used with excellent results in my practice and across the country for more than 200 patients.

Because the MBB covers part of the sole as well as the upper part of the foot, the ankle is stabilized medially and laterally. The extensive coverage provided by the MBB also maximizes contact with skin mechanoreceptors.

Before recommending the MBB or any AFO, the podiatric physician should always conduct a fall risk assessment and provide a referral for strengthening and exercise with physical or occupational therapy. My practice brings patients back into the office after about a month of MBB use for a follow-up appointment with our therapy team. The therapists put the patient through several assessments with and without their AFOs to assess benefit. I am collecting data for a study to demonstrate the effectiveness of these devices in improving balance, specifically targeting reduction in postural sway.

The Role of Footwear in Fall Prevention

Helping patients choose the right kind of footwear for fall prevention is a fundamental responsibility of podiatric physicians.

I have always advocated maintaining and offering a shoe recommendation guide for all of the more common conditions we see.

Put protocols in place so that you and your staff make seniors aware of the following recommendations to help prevent falls:

- Avoid shoes that are excessively flexible and worn.
- Wear shoes that encourage activity. Walking shoes and leisure shoes that are lightweight are often the best, as long as the midsole is not too flexible.
- Avoid open-backed shoes or open-backed house slippers.
- If your foot swells during the day, stretchable Lycra shoes are best, as long as they remain supportive and are not too flexible.
- Proper fit is critical. Shoes that are too big can be a hazard, but so can shoes that are too small and cause calluses, corns, and sores.
- Depth shoes are good for balance because they often support the foot higher toward the ankle.
- Shoes that are lower to the ground are always the best. Anything with a very high or thick sole creates more imbalance. Avoid any shoe with a sole over half an inch.
- Shoes with good padding are more comfortable and are recommended, but too much padding will be like walk-

ing on sand and can push the patient up too high in the shoe.

- Avoid excessively slick-soled shoes, as well as those that are too “grippy.” A crepe sole is recommended because it also absorbs shock.
- Velcro laces are ideal, but Velcro latching is often neglected, thus creating a situation where the shoe can become too loose. Shoes with laces are fine, as long as they are tied snugly to create a good fit.

Research has demonstrated the effectiveness of strength and balance exercises in reducing the risk of falls in older adults.

- In numerous studies, those who went barefoot or wore slippers in the house were found to be at the highest risk for falling.
- Wearing shoes with low heels and a large or wide contact area may reduce the risk of a fall in everyday settings and activities.
- Diabetics and seniors should avoid open-toed shoes, sandals, and flip-flops.
- If patients report bending over to put on their shoes makes them dizzy or off-balance, suggest a long-handled shoe horn.

Experience suggests that many seniors have a very difficult time finding shoes that are comfortable and that successfully address their foot or ankle problems.

Develop a “Dr. ____’s Shoe Recommendation List” to help elderly patients find the right shoes. This list can be a great marketing tool for your practice.

Physical/Occupational Therapy and Fall Prevention

Research has demonstrated the effectiveness of strength and balance exercises in reducing the risk of falls in older adults. Physical therapist researchers at California State University, Northridge, performed a study to determine the effectiveness of a balance exercise training program on strength, balance, gait, and fall risk in 23 healthy community-dwelling

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older adults at risk for falls. Subjects were randomly assigned to an exercise group or non-exercise control group. The exercise group performed a small group-based balance program, “A Matter of Balance,” for 12 weeks, three times a week in a class setting at the PT department.

According to the authors, the exercises included balance exercises standing on foam surfaces and balance boards, as well as squats with an exercise ball. After the training program, the exercise group significantly improved lower extremity strength, improved their balance and functional mobility, and reduced their incidence of falls compared to the control group.⁶

The Cochrane Collaboration conducted a systematic review of fall prevention studies incorporating exercise programs such as progressive muscle strengthening, balance training, and a walking plan, individually tailored for each participant by a trained health professional. Pooled data from these studies indicate that such programs significantly decreased the number of individuals experiencing a fall over one year when compared with a control group that received no intervention. The number of patients injured during a fall

also was significantly reduced. The evidence was strongest for balance retraining, supporting inclusion of these exercises as a component of fall prevention programs.^{7,8}

Conclusion

There is no one fall prevention strategy that will work for all patients. Falls appear to happen because of a complex interaction of intrinsic and extrinsic risk factors, so interventions require a similarly multifaceted approach. A strong fall prevention strategy that encompasses a number of interventions and targets multiple risk factors is more likely to be successful.

It won't take long for you to identify patients in your practice who are at risk for falling, and over the next decade, we all will be seeing many more. With a proper assessment, followed by targeted intervention to address modifiable risk factors, podiatrists can make an enormous difference for our patients. ■

**Disclosure: Dr. Moore is the developer of the Moore Balance Brace. Learn more at www.fallpreventionbrace.com.*



Des Moines University College of Podiatric Medicine and Surgery Full-time Faculty Member Position

Located in Des Moines, Iowa and established in 1898, Des Moines University is an integrated medical institution offering clinical degrees in podiatric medicine, osteopathic medicine, physical therapy, and physician assistant studies.

Faculty in the College of Podiatric Medicine and Surgery will participate in academic, clinical patient care, scholarly, and service activities within the College and University.

Qualified candidates must hold a DPM degree and be licensed or eligible for licensure in the state of Iowa. In addition, the candidate must be board qualified or board certified by the American Board of Podiatric Surgery or American Board of Podiatric Orthopedics and Primary Podiatric Medicine. Prior academic experience is desirable.

Salary and benefits package are competitive including participation in the University clinical practice plan.

To be eligible for consideration, candidates must submit the following information, to the attention of Search Chair, CPMS Faculty Search Committee, using the online applicant system found at www.dmu.edu/employment: (1) CV, plus letter of interest, including a statement of teaching experience, philosophy, and goals in areas of scholarly activity, patient care, and service; and (2) contact information for three professional references. Candidates with questions specific to this position may call Dr. Tim Yoho, Dean, at 515-271-1464. For a complete job description, summary of full-time faculty benefits and/or other information, please visit www.dmu.edu/employment.

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For the elderly living at home, 1/3 to 1/2 almost or do fall. Fall Prevention made easy with Moore Balance



The MBB can stabilize the foot and ankle and worn as a pair, increase sensorimotor function.

Coding and Reimbursement

Codes that may be used for billing:

L1940, L2330, L2820 x 2

Medicare ceiling, each: \$1099

MBB, cost, each: \$335

SafeStep™ Features Free Electronic Billing and Compliance Documentation:

- MBB Medical Necessity Form
- MBB Chart Dispensing Note
- MBB Patient Receipt
- Printable Work Order
- References and Information
- Fall Risk Assessment Form

The final and sole responsibility for the correct coding, within established laws, Fall Prevention Protocols and standard of practice, rests upon the party submitting the claim.

CLINICAL INDICATIONS

- Ankle instability
- Peripheral neuropathy
- Ankle osteoarthritis
- Mild foot drop
- Vestibular disease
- History of fall or near fall
- Walking difficulty

Falls are the leading cause of injury leading to death among older adults. Fall-related hip fractures account for approximately 25% of injuries leading to death among those over age 65, and 34% among those 85 or older. Fall related injuries occur more commonly than strokes and are the most preventable cause of nursing home placement.

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