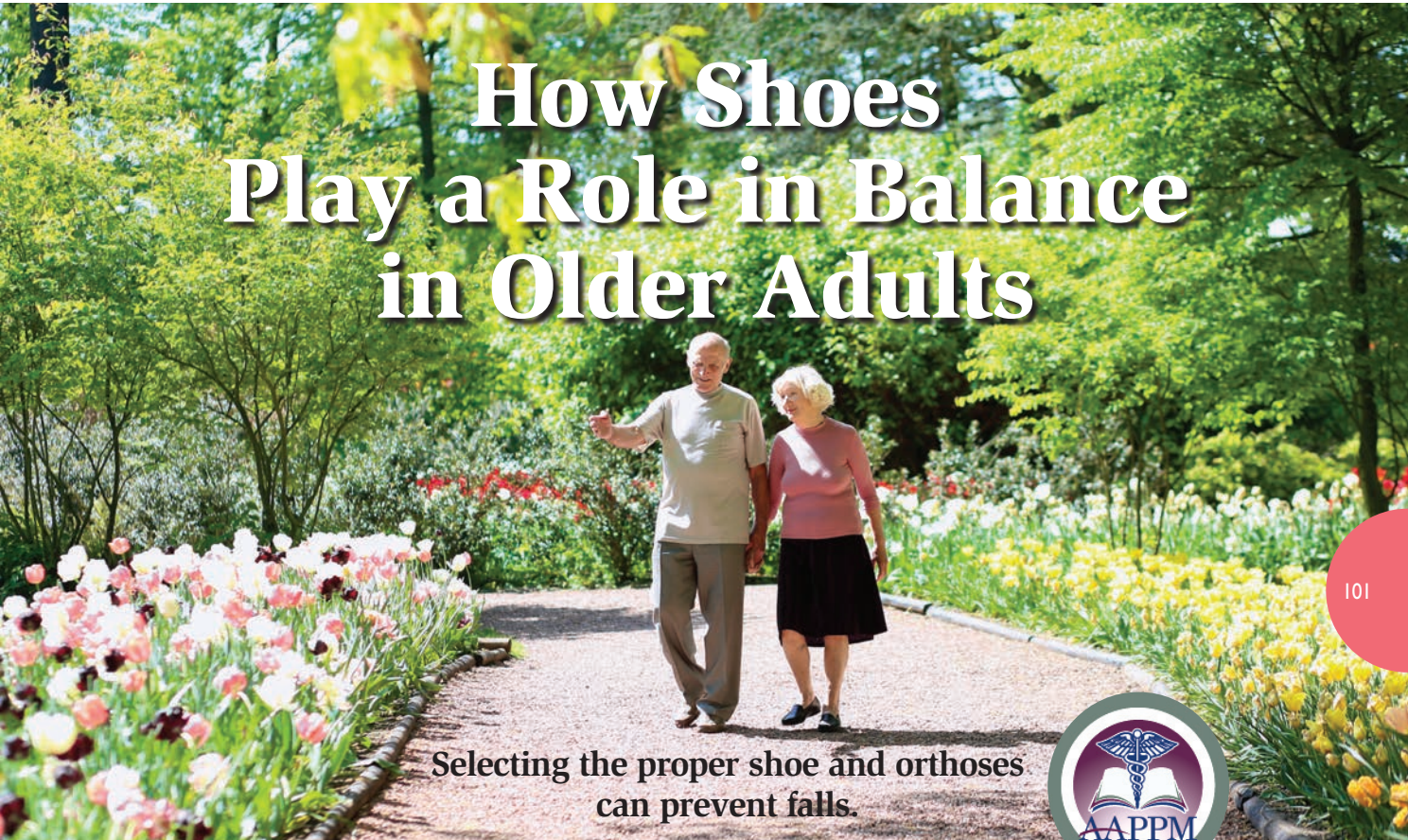




How Shoes Play a Role in Balance in Older Adults



Selecting the proper shoe and orthoses can prevent falls.



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As foot and ankle experts, we are in the business of identifying risk factors that can lead to improved mobility and less pain and disability. While many in the podiatric world can list the best shoes for plantar fasciitis or posterior tibial tendonitis, most probably don't know how to recommend the right shoe for a senior at risk for falling.

If you haven't already noticed, the number of seniors among our patient population who are at risk for falling has exploded within the last five years, and the number of

those who are at risk is increasing. However, few doctors recommend shoes to their patients. Even for every-day garden variety foot conditions, many podiatric doctors either don't know what to recommend,

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don't care, or have flat-out inaccurate or outdated information. Even those who do know a shoe or two to recommend have nothing available to give to patients.

buy. It should be obvious that proper footwear plays a key role in outcomes for a large percentage of the foot pathology we treat every day.

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Furthermore, be aware that your patients expect you to know what shoe to buy and what shoe to avoid.

They expect to be given accurate and relevant information about their footwear. Most patients would prefer this knowledge over minutiae like the Windlass mechanism. Without going into detail about the incredible marketing benefits afforded by practices that have a shoe recommendation sheet or that at least maintain this information in their office, suffice it say that it is important to have this information, share it, and keep it updated.

Better yet, be one of a growing number of practices that offer a wide variety of physician-recommended footwear in a retail setting. While there is great value in this type of service, that is not the object of this article. The objective is to answer the question: Do shoes play a role in balance among seniors? The answer is YES in more ways than one.

It has been well-recognized that many older people wear suboptimal footwear^{1,2} and that inappropriate footwear may and often does impair balance and alter gait.³ Furthermore, the medical literature is abundantly clear that foot and ankle characteristics do play a role in balance and falls among the elderly. Reduced ankle flexibility, weakness of the

est some, this data is of major significance to the growing number of those who are involved in treating balance and gait deficits every day. For those of you who are addressing these risk factors, you are helping to reduce falls and saving lives among a growing segment of our population. Seniors are a key part of our success in practice. Not catering to their needs is a critical mistake clinically

key clinical questions that will play a role in what we recommend to our patients.

1) *Foot Type: Is there significant deformity, and if so, what type of deformity is present? Is there edema/lymphedema present? Is the foot a slender, bony type or an edematous wider foot with more girth?*

2) *Muscle strength/Ankle joint stability/flexibility: Does the patient*

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as well as from a practice management standpoint.

It was this data, among a plethora of additional clinical observations, that led the author to develop a lightweight, flexible ankle foot orthosis (Moore Balance Brace) for seniors to improve mobility, reduce gait deficits, and improve postural stability.

Additionally, it became more important than ever to have a Podiatric Fall Risk Assessment tool (see Figure 1 on pg. 106) that any physician could use to establish and document the key risk factors for falling. However, despite these tools and even with an AFO, senior patients need

use a walker or cane? Does the patient have stiffness or pain causing alteration of gait and balance? Does the patient develop fatigue and weakness, altering gait?

3) *Does the patient wear an AFO for balance, for a previous CVA, or some other condition? What type of AFO is being employed? Is the shoe the patient is wearing with the AFO making balance worse? Are the shoes too big or bulky?*

4) *Does the patient have neuropathy, or have an at-risk foot from diabetes? Is diabetic footwear an option? Does the patient have Parkinson's or some other condition that impacts proprioception and muscle function? Does the patient require a multi-density orthotic due to deformity in the mid-foot or forefoot?*

5) *Are there obvious gait deficits that are altering the patient's stability? Does the patient shuffle, drag the feet, or have abnormally slow gait?*

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ankle dorsiflexors, foot pain/deformity, reduced plantar tactile sensitivity, among other foot characteristics, have all been found to be predictors of falls among seniors.

Ankle flexibility contributes to poor postural sway and poor balance, ataxic gait, and reduced walking speed.^{4,5,6,7}

According to one study, muscle weakness, gait deficits, and balance deficits accounted for three of the top five risk factors for falling among seniors.⁸ While this may not inter-

the right shoe first and foremost, and there is certainly no one in a better position than a podiatrist to educate and inform our patients about proper vs improper footwear.

Shoe characteristics have been shown to influence balance in older adults, but what should we be recommending to our patients? Is there one perfect senior balance shoe on the market? Unfortunately, no...but until that "perfect" shoe arrives, we must analyze and answer several

While there are other clinical factors that could be discussed, these are the key clinical factors that should govern what type of shoe the patient needs. First and foremost, patients at risk for falling are often easily identified and should have a fall risk assessment. Patients on walkers or canes or who have a clear gait deficit are obvious candidates. Those who have a history of falling or those who have severe neuropathy or Parkinson's should be assessed

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as well. Despite the fact that literally dozens of at-risk patients walk into our offices every day, less than 5% of podiatric physicians perform fall risk

AFO. Aside from writing a prescription or performing a five-minute fall risk assessment (both of which take little time or skill), recommending a proper shoe for your senior patients while educating them about their risk

established that most falls occur in the home where seniors are already hardwired to kick their shoes off.

Knowing full well that our patients are walking in a variety of flimsy house slippers or, worse yet, flip-flops in their house, we should be counseling and providing them with information as to their increased risk for falling. However, simply telling your patients to stop doing something without giving them a logical and appropriate substitute is counter-productive.

Sometimes, we need to gently yet firmly tell our senior patients (and their family) that walking without shoes (slippers and flip-flops are not shoes) in the house is not only dangerous, it can lead to a fall. Older adults who are barefoot or wearing socks are more prone to fall as a result of slipping and trauma from unexpected obstacles.¹⁰

A recent survey of the footwear

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assessments, and even fewer actually do something about their risk even if it's documented.

Unfortunately, the skill set among podiatric physicians varies widely, thus the reason why many have never performed a fall risk assessment nor even cast a patient for an

is something everyone can do.

So what does the medical literature say about shoe characteristics and balance? First, studies have made it clear that seniors walking barefoot or in their sock feet at home have a significantly higher likelihood of falling.⁹ It has been further well

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purchased by 128 community-dwelling people (including 60 men) aged over 65 years, revealed that the majority wore slippers in their homes and that 32 percent of women and 28 percent of men usually walked barefoot or wore socks.¹¹

Seniors in their home want something that is light-weight and which they can “slip” on instead of having to latch the shoe onto their foot. Obviously, anything that is loosely attached to the foot can lead to tripping, slipping, and falling.

Thus, knowing that many senior patients will not wear anything heavy in the house, we have to accept that whatever we recommend cannot be heavy. While it would be nice to be able to recommend a New Balance 928 Velcro shoe, this isn't realistic. The problem is that some seniors often feel that any shoes other than their slippers feel heavy. To some, the lightest shoe is heavy, but we can't let this deter us.

So, the first consideration for recommending shoes for seniors is understanding that most seniors wear an “inside shoe” and a different shoe for “outside.” While few seniors wear good shoes either way, most will kick

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off their outside shoe in favor of a flip flop or slipper in the house. Knowing that most falls occur inside the house, we can't allow our patients to think that walking in poor (or no) footwear in the house is acceptable.

Thus the first shoe characteristic vital to improving balance and getting patients to wear what you recommend is the weight of the shoe. The lighter the shoe, the better; especially for those who have weakness, shuffling, or for those who wear an AFO. Secondly, patients will be much more likely to be compliant wearing their shoes, IF they are easy to put on and take off. Recommending a Velcro shoe with a slightly extended tongue will make donning much easier.

Previous studies have found that balance can be impaired when older adults wear shoes that have elevated heels, are backless, or are lower heel collared, and those shoes that have overly soft insoles reducing tactile sensitivity to the ground.^{12, 13, 14, 15}

While these characteristics are somewhat obvious, finding the right shoe that is light and yet is stable in the heel counter and midsole isn't easy. Often, the more stable the shoe is, the heavier it is.

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FIGURE 1:
Podiatric Fall Risk Assessment Form

Patient Name: _____ Date _____

Circle appropriate score for each section and total score at bottom.

Parameter	Score	Patient Status/Condition
A. Vestibular (Dizziness)	0 2 4	No complaints of dizziness. Intermittent complaints of dizziness. Dizziness that interferes with ADLs.
B. History of Falls (past 12 months)	0 2 9	No falls 1-2 falls or near falls 3 or more falls or near falls
Demographics	1 2	Female Female > 65 years
D. Vision Status	0 2 4	Adequate (w/ or w/o glasses) Poor (w/ or w/o glasses) Legally blind
E. Gait and Balance	----- 0 1 1 1 1 1 1	Have patient stand on both feet w/o any type of assist then have walk: forward, thru a doorway, then make a turn. (Mark all that apply.) Normal/safe gait and balance. Balance problem while standing. Balance problem while walking. Decreased muscular coordination. Change in gait pattern when walking through doorway. Jerking or unstable when making turns Requires assistance (person, furniture/walls or device).
F. Ankle Strength/Range of Motion	0 2 4	Normal ankle strength and ROM within normal limits. Moderate limitation of ankle joint range of motion and strength. Significant ankle joint instability and weakness.
G. Medications	----- 0 2 4 1	Based upon the following types of medications: anesthetics, antihistamines, cathartics, diuretics, antihypertensives, antiseizure, benzodiazepines, hypoglycemics, psychotropics, sedative/hypnotics. None of these medications taken currently or w/in past 7 days. Takes 1-2 of these medications currently or w/in past 7 days. Takes 3-4 of these medications currently or w/in past 7 days. Mark additional point if patient has had a change in these medications or doses in past 5 days.
H. Predisposing Diseases	----- 0 2 4	Based upon the following conditions: neuropathy, hypertension, vertigo, CVA, Parkinson's Disease, loss of limb(s), seizures, arthritis, osteoporosis. None present. 1-2 present. 3 or more present.
I. Get Up and Go	0 2 4	Able to rise in a single motion (no loss of balance with steps). Pushes up, successful in one attempt. Multiple attempts to get up, but successful.
J. Walk and Talk	5 8	Inability to maintain normal gait pattern while walking. Must stop walking in order to speak.

TOTAL SCORE _____ A score of 10 or more indicates high-risk for falls.

Patient has been informed about fall risk assessment results and safety/fall prevention recommendations: ___ Yes ___ No

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FIGURE 1:
Podiatric Fall Risk Assessment Form *(Continued)*

Comments: _____

Physician Signature _____

Fall Risk Assessment Algorithm

**Fall Risk Score of 10
or Greater**

**Additional Services
Needed**



Physical/Occupational Therapy

- ADL Deficits
- History of falls
- Unsafe Living Environment
- Sensory Deficits
- Impaired Mobility
- Weakness
- Failed Walk-Talk Test

Primary Care

- Vestibular Abnormalities
- Medication changes
- Hypertension/Hypotension
- Seizures

Podiatric Evaluation for Balance Brace

- History of Falls
- Ankle Joint instability or decreased ROM (osteoarthritis, Charcot, CVA)
- Sensory Deficits (peripheral neuropathy, lack of somatosensory feedback)
- Failed Romberg Test (eyes closed)
- Failed Get Up and Go Test

1. The patient was referred to PT or OT for further assessment for fall prevention therapy.
 Yes No

2. The patient was prescribed a balance AFO with the goals of improving postural sway, increasing ankle ROM and stability while also improving the somatosensory response for fall prevention.
 Yes No

3. The patient was educated in detail regarding fall risk and prevention including proper shoe wear use in the home, reducing obstacles in the home and physical exercises to improve strength and range of motion of the foot and ankle.

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The lightest shoes on the market are shoes that are made of Lycra. While Lycra shoes have been widely used for those patients with swelling and for those who need a “stretchable” shoe for an AFO, these types of shoes can also be very valuable for balance.

The first thing that you may think is, “My patients think those shoes are ugly and won’t wear them”... and you may be right; however there

are some Lycra shoes that are more attractive than others. Do your homework, and don’t let fashion or style dictate what you recommend to your at-risk patients. If we do our job well in explaining to patients fall risk and the devastating consequences of falls, they will be more likely to wear something that may be perceived as less attractive. Don’t be afraid to tell your patients that wearing a “pretty” shoe isn’t worth ending up in a nursing home.

Another key to identifying the

right shoe for those with imbalance is fit. Patients who have poor balance can be made much more imbalanced with a shoe that is too big. We must keep this in mind when recommending shoes for our senior patients. Offices should measure and provide the footwear recommended and staff should be astutely aware of how important it is to measure and fit seniors with care to make sure the right shoe size is ordered.

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Many seniors have worn shoes too small or too narrow for decades, and when fit with something that actually fits them, they feel unsteady and temporarily uncomfortable. Educate these patients as to what to expect

Keep in mind that not all patients at risk for falling come into your office using a cane or walker.

and that it may take time for them to get acclimated.

Next, realize that, as mentioned above, putting a senior at risk for falling in a shoe with too thick of a sole or anything with a heel can seriously compromise balance. Remember that keeping patients as close to the ground as possible will keep them better balanced. It for this reason too that putting at-risk patients in overly thick insoles or orthotics can compromise balance and proprioception.

If a fall-risk patient is also at risk for diabetic ulceration, keep in mind that, as these patients are often severely neuropathic, putting them into a very thick

multi-density orthotic can compromise balance. In these cases, modify the orthotic to thin it down and make sure to accommodate the patient's deformity without compromising balance.

Another point of consideration is shoe tread. Keep in mind that for those who have a shuffling gait pattern or a weakness in the dorsiflexors, shoes with too much tread can be a huge hazard.

Keep in mind that not all patients at risk for falling come into your office using a cane or walker. There are many patients who are in their 50s or 60's working on a farm or in a factory who wear balance AFOs with a Brooks or New Balance shoe.

Few of those patients using a walker or cane who are not working and are either in a nursing home or assisted living facility care about what their shoe looks like. They don't want to fall and they want something easy to put on.

In this "fragile" patient category, Lycra/Velcro shoes with a firm heel counter and stable midsole that is low to the ground is the best option. If the patient is a candidate for a Balance AFO, keep in mind that the AFO needs to sit on top of the thin orthotic provided with the AFO in

The biggest mistake one can make in dealing with patients who require AFOs is not putting them in a good shoe.

order to keep the foot low to the ground and to allow the AFO to function effectively by sitting on the bottom of the shoe.

Putting a Balance AFO (or any AFO for that matter) on top of a thick orthotic or diabetic insole is a mistake. This often puts patients too high in the shoe and can decrease what little proprioception remains. Additionally, this will make the AFO hard to fit into the shoe.

The biggest mistake one can make in dealing with patients who require AFOs is not putting them in a good shoe. Allowing a patient with any type of AFO to wear their worn out Sketchers or Easy Spirits is a critical mistake. No one can expect good outcomes from any orthosis if it is not in a good shoe. Not providing or at least informing patients about what kind of shoe to get prior to casting them for an AFO is one of the biggest mistakes one can make. Without question, improper shoeing of AFOs and orthotics is the number one cause of failure.

In closing, keep in mind that patients with poor balance and altered gait will not magically be cured with a new shoe. You have to watch these patients walk and perform an objective fall risk assessment to really get a full scope of what risk factors are present.

It is clear that shoes are important, but so are physical therapy, strengthening, balance treatments and medical management for the variety of other causes of falling. Many falls experienced by older people re-

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sult from age-related deterioration of the balance and neuromuscular systems,¹⁶ but most falls occur during motor tasks.¹⁷ If there is weakness, shuffling, and ataxic gait involved, considering a balance AFO can be valuable; but if you go this route, don't forget how important the shoe is.

It has been clearly demonstrated that footwear has been a key risk factor for both indoor and outdoor

teristics of old people who fell at home. *J Clin Exp Gerontol.* 1980;2:271-287.

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As shoes are an easily modifiable risk factor for falls, identifying the specific shoe features that might facilitate or impair balance in seniors is imperative.

falls.^{18,19} By altering somatosensory feedback to the foot and ankle and by modifying the type and quality of the shoe, we can positively influence postural stability and reduce the risk of slips, trips, and falls. While the primary role of a shoe is to protect the foot and facilitate propulsion, fashion has strongly influenced the design of footwear throughout the years, compromising the natural functioning of the foot.²⁰

As shoes are an easily modifiable risk factor for falls, identifying the specific shoe features that might facilitate or impair balance in seniors is imperative. **PM**

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