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## Older Adult Falls: Effective Approaches to Prevention

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### Abstract

**Purpose**—The issue of older adult falls combines a problem with high incidence and high injury susceptibility with an increasing population at risk. A firm understanding of both fall risk factors and effective strategies is required to reduce risk and prevent these injuries.

**Recent Findings**—Each year, 28.7% of older adults aged 65 sustain a fall. At the national level, this represents 29 million falls resulting in 27,000 deaths and 7 million injuries requiring medical treatment or restricted activity for at least 1 day. There are several strategies that have been shown to effectively reduce the risk or the incidence of falls.

**Summary**—More than 90% of older adults see a medical provider at least once a year providing an opportunity to identify and address fall risk factors. Comprehensive fall prevention in the primary care setting is both feasible and practical.

### Keywords

Senior falls; Fall prevention; Effective fall prevention; Clinician role fall prevention

### Introduction

Beginning in 2011 and continuing for a span of 19 years, roughly 10,000 Americans turn age 65 every day. By the year 2030, when the last of the Baby Boomers reaches this milestone, 18% of our total population will be age 65 or older [1]. Much has been written about the changes the Baby Boomer generation will have on our population—on our demographics, culture, and economy—for public health, the issue of falls is gaining attention as a preventable condition. With the growing population of older adults comes a growing falls problem [2].

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#### Compliance with Ethical Standards

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the author.

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Each year, more than one in four (28.7%) older adults aged 65 sustain a fall. At the national level, this represents 29 million falls resulting in 7 million injuries requiring medical treatment or restricted activity for at least 1 day [3•]. These numbers describe the issue as of 2014, just 4 years into this surge. Using 2014 results as a guide, an estimated 49 million falls will result in 12 million injuries by the time all Baby Boomers reach age 65 in 2030. These numbers translate into significant costs. The average medically treated fall costs nearly US\$10,000 in direct medical costs making current Medicare costs for older adult falls on par with those of cancer treatment [4•, 5]. Fall injuries among older adults ranked fifth in personal healthcare spending in 2013 [6•]. However, incidence alone gives an important but incomplete assessment of the problem. Since the year 2000, the fall death *rate* has more than doubled so that today, more than 27,000 older adults die each year from a fall, one death every 20 minutes [7]. Therefore, over and above what we would expect given the increasing size of the older adult population, the risk of death from falls has increased. Living longer with more chronic conditions may explain some of this increase.

The issue of older adult falls combines a problem with high incidence and injury susceptibility (2.8 million emergency department visits and 800,000 hospitalizations in 2014) [7], with an increasing population at risk. The fear of falling and subsequent loss of independence are common concerns among older adults [8–11]. The risk is real as even same-level falls can result in high severity injuries [12]. Moreover, falls are the most common cause of traumatic brain injury among older adults, and 90% of their hip fractures are caused by a fall [13–15]. A firm understanding of the risk factors for falls is required to reduce risk and prevent these injuries.

## Risk Factors

Falls and fall deaths increase with age, but there are other modifiable risk factors that have been identified and can be addressed. For example, in a meta-analysis of 22 studies, Woolcott et al. demonstrated an increased likelihood of falls among older adults taking several classes of drugs: sedatives and hypnotics, neuroleptics and antipsychotics, antidepressants, benzodiazepines, and NSAIDs [16]. A systematic review and meta-analysis by Muir et al. demonstrated a higher falls risk for older adults with balance impairments [17]. Verghese found neurological gait abnormalities (unsteady and neuropathic gaits) were independent predictors of falls [18], and Agrawal et al., using data from the National Health and Nutrition Examination Survey (NHANES), demonstrated a 12-fold increase in the odds of falling among US adults with clinically symptomatic (reported dizziness) vestibular dysfunction [19]. Moreland et al. used data from 13 studies to investigate the relationship between muscle weakness and older adult falls, finding the relationship stronger for upper versus lower extremities and stronger for recurrent versus any fall [20]. Other modifiable risk factors for falls among the older adult population include vitamin D deficiency, gait and/or mobility disorders, postural hypotension, foot and ankle problems, vision impairment, and environmental or home hazards [21, 22, 23••]. In general, the more risk factors a person has the higher their risk of a fall [24]. The next section will discuss strategies to address these modifiable risk factors that can be accomplished in the primary care setting, with a focus on community-dwelling older adults.

## Evidenced-Based Strategies

### Multifactorial Interventions

There are a variety of strategies that have been shown to effectively reduce the risk of falls or reduce the incidence of falls themselves. Notably, multifactorial interventions that are tailored to the individual have been found to reduce falls in clinical trials [23••, 25, 26]. These interventions addressed multiple risk factors, customized to the person's identified risks, ascertained by risk factor assessment [23••].

### Medications

Both a Cochrane systematic review [25] and the review for the updated American Geriatrics Society and British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons (AGS/BGS Guideline) found that withdrawal of certain medications, especially psychotropic medications, was an effective strategy as a single intervention or as a component of a multifactorial intervention [23••, 25]. The updated AGS/BGS Guideline recommends withdrawal or minimization of psychoactive medications with a B grade for the strength of recommendation (i.e., recommendation that clinicians provide this intervention to eligible patients). Beyond the AGS/BGS Guideline, medications that cause dizziness, sedation, confusion, blurred vision, or orthostatic hypotension represent a modifiable risk factor for falls. The Centers for Disease Control and Prevention (CDC) recommends stopping these medications when possible, switching to safer alternatives if stopping is not appropriate, or reducing medications to their lowest effective dose ([www.cdc.gov/steady/materials.html](http://www.cdc.gov/steady/materials.html)).

### Strength and Balance Programs

Exercise, particularly exercise that targets strength, gait, and balance, has been found to reduce fall risk, falls, the rate of falls, and death, although the effect differs by duration, intensity, type, time for follow-up, and other factors [23••, 25, 27, 28, 29, 30]. A systematic review for the US Preventive Services Task Force (Task Force) included 18 trials that involved exercise or physical therapy and found a 13% reduction in the risk of falls in a pooled analysis [27]. A review of 59 systematic reviews found exercise consistently effective for community residents, but not for those in care facilities [29]. Exercise was found effective as a single intervention and as part of a multifactorial strategy. Although the results differed in effect size, outcome measure of interest, and components of the exercise intervention (for example, strength training, balance, resistance, gait and coordination training, endurance), the results overall were robust. The AGS/BGS Guideline recommends an exercise program that targets strength, gait, and balance with the highest grade A recommendation (i.e., a strong recommendation that physicians provide the intervention to eligible patients) and that exercise be included as a component of multifactorial interventions [23••].

There are a variety of community-based fall prevention programs that providers can refer their patients to that have been found effective in randomized controlled trials. Stevens and Burns [31•] produced a compendium of effective programs that include 15 single and 12 multifactorial exercise interventions (<https://www.cdc.gov/homeandrecreationsafety/falls/>).

[compendium.html](#)). Two interventions, delivered in community settings, have also been found to be cost effective [32], Stepping On [33] and Tai Chi [34].

### Vitamin D Supplements

Vitamin D insufficiency is a risk factor for falls and vitamin D supplements are an easy, safe, and inexpensive remedy. The Task Force found a pooled effect of 17% reduction in falls during 6 to 36 months of follow-up over nine studies [27]. Bischoff-Ferrari et al. found a 19% reduction in risk of falls in an analysis of eight randomized controlled trials [35]. However, there has been inconsistency in reported effectiveness with some meta-analyses and systematic reviews finding an effect and others finding no effect [23•, 25–27, 36–38]. For example, Bolland et al. in a meta-analysis combining data from 20 randomized controlled trials found that vitamin D supplementation did not reduce falls by 15% or more [37], and a reanalysis of the Bischoff-Ferrari meta-analysis included in the Institute of Medicine report for Dietary Reference Intakes for Vitamin D and Calcium [38] found that the effects were minimal. Differences in inclusion and exclusion criteria, dose, type of vitamin D, study participants, appropriateness of study design and analysis, and outcome measures are just some of the factors leading to the inconsistent results. Furthermore, additional trials that are underpowered to find an effect using number of fallers instead of the number of falls as the outcome of interest are unlikely to move the field forward [37, 38].

Nevertheless, vitamin D benefits muscle, bone, and nerve health, and inadequate serum levels are associated with an increased risk for falls [39]. Using the Institute of Medicine categorization for deficiency (serum 25OHD <12 ng/mL) and inadequacy (serum 25OHD 12–19 ng/mL), a nationally representative survey found 31% of men over age 70 and 38% of women over age 70 either deficient or inadequate for serum vitamin D [40]. The AGS Workgroup on Vitamin D Supplementation for Older Adults recognized that many older adults will not reach target serum levels of 30 ng/mL with diet alone and recommended that supplementation be advised when necessary [41]. The target level of 30 ng/mL recommended by the AGS Workgroup is well below toxicity levels [41] and vitamin D supplementation is also included as part of the CDC's fall prevention provider materials (<https://www.cdc.gov/steady/materials.html>).

### Foot and Footwear

Foot problems and footwear have been identified as risk factors for falls, but there are few studies that document the effectiveness of addressing these issues as a fall prevention strategy [23•, 25, 42, 43]. A much cited trial by Spink et al. showed a 36% reduction in the falls rate when measured as the number of falls per person but did not show a difference in the proportion of fallers between the intervention and control groups [42]. Although the evidence is not strong enough for an AGS/BGS Guideline recommendation, footwear does affect balance, gait, and posture; therefore, common sense advice to patients to wear shoes and not walk barefoot or in socks at home is warranted, as is advice about low heel height and wearing shoes with slip resistant soles [44].

## Cataract Surgery

Vision impairment is a risk factor for falls; however, how to address the risk is not straightforward. Cumming et al. found that vision assessment and treatment could increase the risk of falls [45]; Day et al. found that vision improvement, when paired with an exercise intervention, was effective in reducing falls, although not as a stand-alone strategy [46]; Harwood et al. found that first eye cataract surgery reduced fall rate and fracture risk among older women [47], yet Foss et al. found that second eye cataract surgery did not [48]. All four studies were randomized controlled trials and were included in the Task Force evidence review that, taking all results into consideration, found no effect [27]. However, given the heterogeneity of vision impairment and treatment, and the positive findings in the Harwood study, the AGS/BGS Guideline recommends expedited first eye cataract surgery with a B grade (clinicians provide this intervention to eligible patients) for older women in whom cataract surgery is indicated [23••].

## Home Modification

Home fall hazards are common, and home visitation and modification by an occupational therapist has been shown to reduce both the fall rate and number of fallers [23••, 25, 29, 49, 50]. The trial reported by Cumming [49] showed a 36% reduction in the proportion of people falling, although only among those with a history of falls. Occupational therapists are trained to teach people safer ways of negotiating their environment; therefore, home visits by occupational therapists are likely to entail more than working through a checklist to remove tripping hazards and the like. Referral to occupational therapy for home modification can be an effective part of a multifactorial fall prevention strategy. The AGS/BGS Guideline gives grade A recommendations (a strong recommendation that physicians provide the intervention to eligible patients) for home environment assessment and intervention for older persons who have fallen or who have risk factors for falling, and for mitigation of identified home hazards, with evaluation and intervention to promote safe behavior [23••].

## How to Incorporate Effective Fall Prevention Activities into Primary Care

More than 90% of older adults see a medical provider at least once a year [51]; this provides an opportunity to identify and address fall risk factors at the provider level. More than one in four older adults fall each year, which suggests a large proportion of those seeing providers are at risk for initial or repeated falls [3•]. However, less than half of those who fall will talk to their provider about it [52]. This may be because older adults do not know that falls can be prevented, or they think fall prevention is not personally relevant, or they may attribute the cause to a temporary condition or lapse in attention and not to something that can be addressed. Even among those who have fallen, a fatalistic assessment of cause will serve to distance themselves from conceding personal risk or potential for a future fall [9, 53]. At the same time, older adults report being more likely to participate in fall prevention strategies if recommended by a provider [54, 55]. Taken together, these findings describe a common problem with modifiable risk factors and complex motivations that providers are well positioned to address.

Although well positioned, there are several key barriers primary care providers face when incorporating fall prevention (screening, assessment, referral, and follow-up) into the primary care setting. Time and reimbursement are most notable, but concerns about patient compliance and the logistics of the setting are also reported [56–58]. Two recent examples provide lessons learned for how to successfully make fall prevention a part of routine care in the primary care setting. Both examples implemented the STEADI (Stopping Elderly Accidents, Deaths and Injuries) initiative developed by the CDC. STEADI represents a coordinated approach to implement the AGS/BGS Guideline for fall prevention. STEADI includes resources for providers on how to facilitate screening for fall risk, assessment of patient's modifiable risk factors, and guidance on how to intervene to reduce risk by using effective clinical and community strategies [59]. STEADI has been implemented in NY within United Health Services, and in OR within the Oregon Health & Science University.

In NY, there were many essential factors critical to success: implementation of the fall prevention program had a champion; the champion trained providers and staff in their roles; STEADI was tailored to the existing office workflow; the EHR was modified to include clinical decision support tools; implementation was piloted in one site and adjusted before rolling out more widely; and options for reimbursement were explored (for example, optimal use of evaluation and management codes). Preliminary results indicate that during the first 12 months of implementation, 69% of patients aged 65 and older were screened [60]. Further follow-up is underway.

In OR, there were similar critical success factors: there were champions; champions trained providers and staff; the falls prevention workflow aligned with the usual clinic workflow; the EHR was modified using tools already in use and familiar to providers and staff such as 'dot phrases' (structured note templates), 'doc flowsheets' (data entry tables for scored measures), and 'Smartsets' (all-in-one order sets); and implementation was piloted and adjusted before rolling out more widely. In addition, feedback to providers was ongoing and responsive. For example, in response to a barriers-and-facilitators survey that identified time constraints as a challenge, it was determined that when there was insufficient time to perform a full assessment for an identified high-risk patient, the provider was able to defer that activity to a future visit. Since the annual Medicare Wellness Visit is a longer visit and requires falls screening, the deferred visit could take advantage of this covered visit at a later date [61•]. Further follow-up is underway.

## Conclusion

On average, an older adult falls every second of every day. With the number of older adults and fall death rates rising, the situation will decline without active participation from all health sectors, especially primary care. While there are differences in fall incidence by state, from a low of 21% in Hawaii to a high of 34% in Arkansas [3•], no matter where you live and practice, at least one in five older adults report falling. Unlike other public health problems, we know quite a bit about burden, risk factors, and effective prevention strategies. We are at the point of putting what we know about the issue into action. In other words, not "What should we do?" but "How should we do it?" for the best patient outcome. Results are



coming in that support comprehensive fall prevention in the primary care setting as both feasible and practical.

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