

# Summary of the Updated American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons

*Developed by the Panel on Prevention of Falls in Older Persons, American Geriatrics Society and British Geriatrics Society*

The following article is a summary of the American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons (2010). This article provides additional discussion of the guideline process and the differences between the current guideline and the 2001 version and includes the guidelines' recommendations, algorithm, and acknowledgments. The complete guideline is published on the American Geriatrics Society's Web site ([http://www.americangeriatrics.org/health\\_care\\_professionals/clinical\\_practice/clinical\\_guidelines\\_recommendations/2010/](http://www.americangeriatrics.org/health_care_professionals/clinical_practice/clinical_guidelines_recommendations/2010/)). *J Am Geriatr Soc* 2010.

The risk of falling and sustaining an injury as the result of a fall increases with age.<sup>1,2</sup> Falls are not only associated with morbidity and mortality in the older population, but are also linked to poorer overall functioning and early admission to long-term care facilities.<sup>3-5</sup> For older community residents, effective fall prevention has the potential to reduce serious fall-related injuries, emergency department visits, hospitalizations, nursing home placements, and functional decline. Reducing fall risk in older individuals is therefore an important public health objective.<sup>6</sup>

The Guideline for the Prevention of Falls in Older Persons was published in May 2001.<sup>7</sup> The present publication updates the earlier guideline by evaluating evidence and analyses that have become available since 2001 and by providing revised recommendations based on these evaluations.

The development of this guideline update began by convening a panel comprising members from the previous panels and new members with substantial knowledge, ex-

perience, and publications in fall prevention and care of older patients. Panel members included experts in physical therapy, pharmacy, orthopedics, emergency medicine, occupational therapy, nursing, home care, and geriatric clinical practice. The literature search included meta-analyses, systematic literature reviews, randomized controlled trials (RCTs), controlled before-and-after studies, and cohort studies published between May 2001 and April 2008. (The panel reviewed the RCTs published between April 2008 and July 2009 and concluded that the additional evidence did not change the ranking of the evidence or the guideline recommendations. The negative RCTs of multifactorial interventions all involved risk factor assessment with referral without direct intervention or ensuring that the interventions were instituted.)

In addition to Medline and PubMed, the following databases were searched: Database of Abstracts of Reviews of Effectiveness, Centre for Reviews and Dissemination/Health Technology Assessment, and the Cochrane Central Register of Controlled Trials. Interventions aimed at bone health (e.g., medications for osteoporosis) and the topics of syncope, restraints, bone protection (e.g., hip protectors), and inpatient hospital-based fall prevention, although important to fall and injury prevention, were not included in the evidence review or guideline.

Each expert panel member completed a disclosure form at the beginning of the guideline process that was shared with the entire expert panel at the start of its two expert panel meetings. Conflicts of interest in this guideline have been resolved by having the guideline independently peer reviewed and then edited by the Expert Panel Chair, who had no conflict of interest with the medications being discussed. Expert panel members who disclosed affiliations or financial interests with commercial interests involved with the products or services referred to in the guideline are listed under the disclosures section of this article.

## CLINICAL ALGORITHM

The clinical algorithm describes the systematic process of decision-making and intervention that should occur in

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the management of older persons who present in a clinical setting with recurrent falls or difficulty walking or in the emergency department after an acute fall. For some interventions, outcome data were insufficient to allow evidence-based recommendations to be made, or the existing literature was ambiguous or conflicting. In these cases, the panel made recommendations based on consensus after intensive discussion.

### Grading the Strength of Recommendations

A standardized format based on an evidence rating system used by the U.S. Preventative Services Task Force was used to critically analyze the literature and grade the evidence for this document.<sup>8</sup>

Based on overall quality of evidence and magnitude of benefit for each intervention, the committee assigned a rating of A, B, C, or D to each recommendation (A = a strong recommendation that physicians provide the intervention to eligible patients, B = a recommendation that clinicians provide this intervention to eligible patients, C = that no recommendation for or against the routine provision of the intervention can be made, and D = that the panel recommends against routinely providing the intervention to asymptomatic patients). If evidence was insufficient to come to a decision for or against the intervention, the panel assigned a rating of I.

### Changes Since the 2001 Guidelines

#### Assessments

The 2010 guidelines, although recommending a multifactorial fall risk assessment for all older adults who present with a fall or who have gait and balance problems, also calls for a multifactorial falls risk assessment for individuals who simply report difficulties with gait or balance. A falls risk assessment is not considered necessary for older persons reporting only a single fall without reported or demonstrated difficulty or unsteadiness.

The history of fall circumstances is more specific in the 2010 guidelines, including questions about frequency of falling, symptoms at time of fall, and injuries from fall.

New specific recommendations for assessment include examination of the feet and footwear, functional assessment (assessment of activity of daily living skills, including use of adaptive equipment and mobility aids, as appropriate); assessment of the individual's perceived functional ability and fear related to falling; and environmental assessment, including home safety.

#### Interventions

New recommendations specify that direct interventions addressed for the identified risk factors, performed by the health professionals who performed the assessment or other healthcare professionals referred by them must follow the multifactorial fall risk assessment.

All multifactorial interventions for community-residing older people should have an exercise component. Exercise recommendations in the 2010 guidelines specify programs that include balance, gait, and strength training, such as tai chi or physical therapy, in group programs or as individual programs at home. The 2001 guidelines were unable to recommend tai chi, because inadequate data were

available at that time. Endurance and flexibility training are supported but not as sole components of a program. Current data support exercise programs only for community-dwelling older persons, in contrast to the earlier guidelines, which recommended long-term exercise and balance training for all older people who have had recurrent falls.

A healthcare professional should perform environmental adaptation or modification, not only environmental assessment, as part of a multifactorial fall risk assessment and intervention for all older persons who have fallen or who have risk factors for falls. The intervention should include mitigation of fall risk factors identified in the home and evaluation and interventions to promote safe performance of daily activities.

Cataract surgery on the first eye should be expedited in older persons in which the surgery is indicated; however, the new guidelines recommend against vision assessment or intervention as an individual approach outside of a multifactorial assessment and intervention strategy.

Medication reduction or withdrawal is stressed for all older people, not only for those taking four or more medications, as in the earlier guidelines.

Assessment and treatment of postural hypotension should be included as part of a multifactorial intervention approach.

Dual-chamber cardiac pacing should be considered for older persons with cardioinhibitory carotid sinus hypersensitivity who experience unexplained recurrent falls.

Vitamin D (800 IU) is recommended as a daily supplement for all older adults at risk of falls. Vitamin D is also recommended for all older adults with known vitamin D deficiency and should be considered for those suspected of having vitamin D deficiency. There is strong evidence for vitamin D supplementation (800 IU/d) in patients residing in long-term care who have known vitamin D deficiency; vitamin D supplementation should also be considered for those with problems of gait or balance or who are otherwise at risk for falls residing in long-term care.

No specific recommendations are made for or against assistive devices, alarms, or hip protectors.

For older persons with cognitive impairment, there is insufficient evidence for supporting any recommendations to reduce fall risk.

### SCREENING AND ASSESSMENT

Further explanation of the basis of the clinical algorithm is provided below (Figure 1).

**Annotation A:** *Older Adult Encounters with Healthcare Provider.* This guideline algorithm is to be used in the clinical setting for assessment and intervention to reduce falls in community-residing older persons ( $\geq 65$ ). The guideline algorithm is not intended to address fall injuries per se or falls that occur in the hospital.

**Annotation B:** *Screen for Falls or Risk for Falling.* The screening for falls and risk for falling is aimed at preventing or reducing fall risk. Any positive answer to the screening questions puts the person screened in a high-risk group that warrants further evaluation. All older adults who are under the care of a health professional (or their caregivers) should be asked at least once a year about falls, frequency of falling, and difficulties in gait or balance.

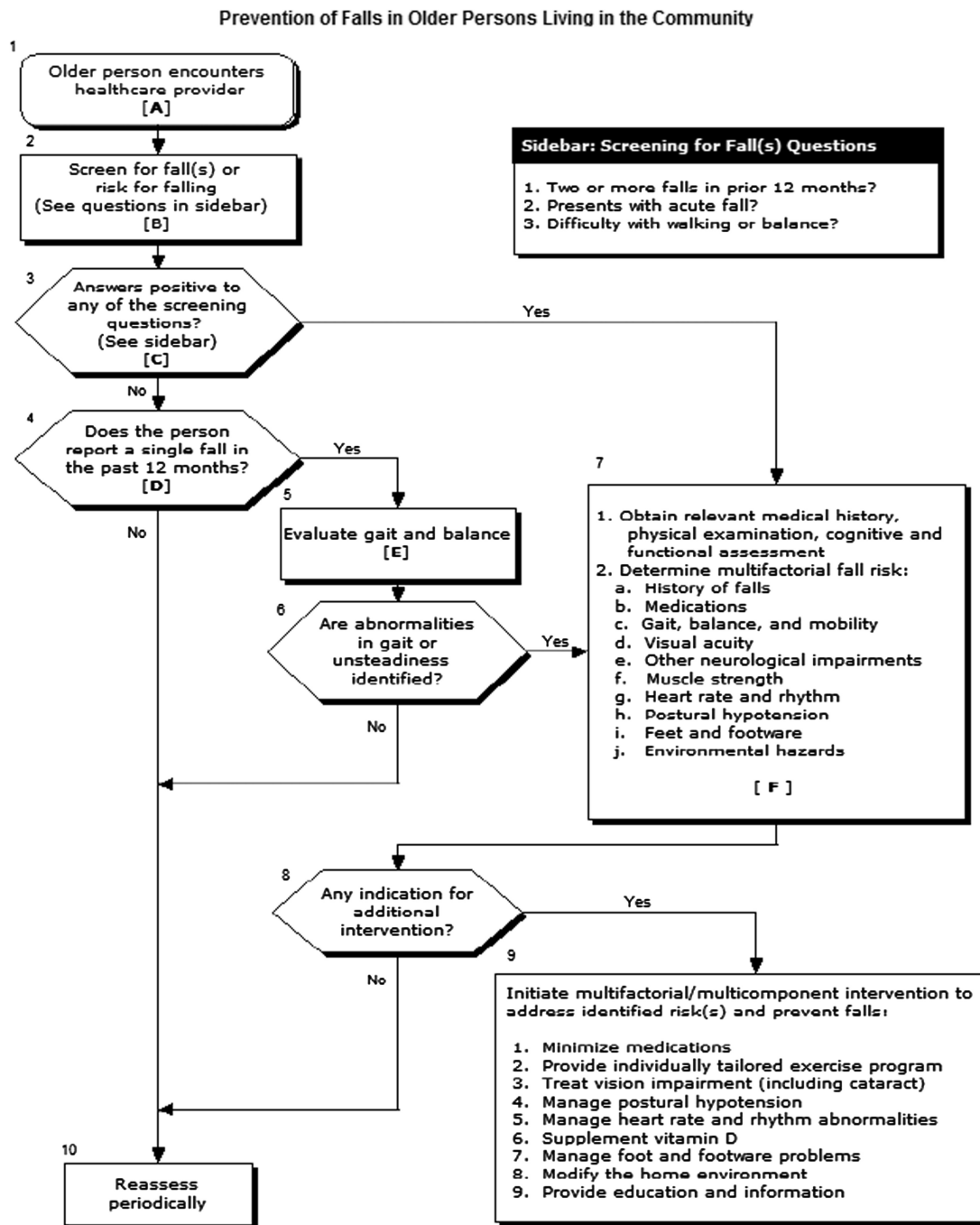


Figure 1. Algorithm and annotations.

**Annotation C: Screen Positive for Falls or Risk for Falling.** Persons at higher risk of falling, identified by screening, should be assessed for known risk factors. A multifactorial fall risk assessment should be performed for community-dwelling older persons who report recurrent ( $\geq 2$ ) falls, report difficulties with gait or balance, or seek medical attention or present to the emergency department because of a fall.

**Annotation D: Report of a Single Fall in the Past 12 Months.** A (first) single fall may indicate difficulties or un-

steadiness in walking or standing. In older individuals, a fall may be a sign of problems in gait or balance that was not present in the past.

**Annotation E: Evaluation of Gait and Balance.** Gait and balance deficits should be evaluated in older individuals reporting a single fall as a screen for identifying individuals who may benefit from a multifactorial fall risk assessment. For persons who screen positive for falls or fall risk, evaluation of balance and gait should be part of the multifactorial fall risk assessment. Frequently used tests of gait or

balance include the Get Up and Go Test;<sup>9</sup> Timed Up and Go Test,<sup>10</sup> the Berg Balance Scale,<sup>11</sup> and the Performance-Oriented Mobility Assessment.<sup>5,12</sup>

**Annotation F: Determination of Multifactorial Fall Risk.** A multifactorial fall risk assessment can reveal the factors that put an older adult at risk of falling and can help identify the most appropriate interventions. A multifactorial fall risk assessment followed by intervention to modify any identified risks is a highly effective strategy to reduce falls and the risk of falling in older persons.

## INTERVENTIONS

### Initiation of Multifactorial or Multicomponent Interventions to Address Identified Risk(s) and Prevent Falls

Two methods for reducing multiple risk factors have been tested in clinical trials. The first method, termed “multicomponent intervention” in this guideline, refers to a set of interventions offered to all participants in a program that addresses more than one intervention category. This method has been used most often in long-term care settings. In the second method, called “multifactorial intervention,” participants are offered only the adjusted subset of interventions that target the risk factors that have been identified through a fall risk factor assessment. This targeted or customized approach has been implemented primarily in community-dwelling older persons.<sup>13</sup> Because of the great heterogeneity among the designs of the multifactorial and multicomponent studies, the panel chose to include trials with multifactorial or multicomponent approaches regardless of dimensions.

Most of the components included in multicomponent or customized multifactorial interventions can be described under the broad headings of exercise and physical activity, medical assessment and management, medication adjustment, environmental modification, and education. A significant body of evidence, including two meta-analyses, supported the multifactorial or multicomponent approach to interventions designed to prevent falls in older persons.<sup>14–35</sup> Risk factor assessment without direct intervention into the identified risk factors does not appear to be effective.<sup>25–28,32,33,36–38</sup> Attention to the following domains are particularly effective: environmental adaptation; balance, transfer, strength, and gait training; reduction in medications, particularly psychoactive medications; and management of visual deficits, postural hypotension, and other cardiovascular and medical problems. The effectiveness of visual interventions other than first cataract surgery is less clear.

### Minimization of Medications

Medications have consistently been associated with risk of falls. The strongest risk associations occur with psychotropic medications and polypharmacy.<sup>39–41</sup> The strongest evidence supports withdrawal of psychotropic medication, as a single intervention and as a component of multifactorial and multicomponent intervention. If discontinuation of a particular high-risk medication is not possible because of medical conditions, dose reduction should be considered. Although some clinicians believe that selective serotonin

reuptake inhibitors (SSRIs) are generally safer to use in older adults than tricyclic antidepressants, in terms of fall prevention, evidence is building that SSRIs increase fall risk as much as the older tricyclic antidepressants. Reduction of psychotropic medication as a single intervention has been found to reduce fall rate,<sup>14</sup> whereas assessment, adjustment, and discontinuation of medication regimens as part of a multifactorial intervention, has also been found to be effective in reducing falls.<sup>19–21,23,34,42</sup>

### Initiation of a Customized Exercise Program

A range of exercise types have been investigated, both individual and group exercises that can be used in isolation or in combination including balance exercises, strength training, flexibility (muscle and joint stretching techniques), tai chi, and cardiovascular, endurance, and fitness training. Because a large body of evidence supports the recommendation that exercise, in the form of resistance (strength) training and balance, gait, and coordination training, is effective in reducing falls, the panel concluded that exercise, in the form of strength training and balance, gait, and coordination training,<sup>15,16,43</sup> should be included as part of a multifactorial or multicomponent intervention to prevent falls in older persons and may be considered as a single intervention. In most positive trials, the exercise program was longer than 12 weeks (1–3 times per week) with variable intensity.

Exercise may be more effective when applied alongside other interventions. Exercise programs were associated with fewer falls in multifactorial and multicomponent studies.<sup>14,19,21,24,31,35</sup> Exercise programs should be initiated with caution because some studies have shown that exercise may increase the rate of falls in persons with limited mobility who are not accustomed to physical activity. Some trials that included balance training<sup>43–48</sup> as part of the intervention showed significant reduction in falls in addition to other benefits in gait, balance, and reduced fear of falling.

### Treating Vision Impairment

Aging is often associated with changes in visual acuity, development of cataracts, macular degeneration, glaucoma, and other conditions that would suggest an effect on risk of falling. If patients report problems or concerns, their vision should be formally assessed, and any remediable visual abnormalities should be treated, particularly cataracts.

A systematic review<sup>15</sup> found no evidence that referral for correction of vision in community-dwelling older people was effective in reducing the number of people falling, although this conclusion was based on a single RCT.<sup>24</sup> Two RCTs assessing the effect of a cataract operation and waiting list time for surgery showed a lower rate of falling for immediate surgery than delayed surgery.<sup>49,50</sup> Three studies that included vision correction as part of a multifactorial assessment and intervention had mixed results.<sup>21,24,51</sup> It remains unclear whether vision is an essential component of multifactorial intervention. One randomized trial examining a vision assessment and follow-up intervention alone indicated that vision assessment and intervention increased risk of falling. This may be related to the effects of adjusting to new glasses.<sup>52</sup>

### Managing Postural Hypotension

Postural hypotension is associated with greater risk of falls. It most commonly occurs as a result of dehydration, concomitant medications, and autonomic neuropathy. Many multifactorial fall prevention programs that have shown benefit for fall prevention have included medication reduction and simplification to modify postural blood pressure, as well as specific strategies such as hydration, elastic stockings, abdominal binders, and medications (e.g., fludrocortisone and midodrine). Managing postural hypotension should be included as a component of multifactorial intervention in community-living older persons.

Three RCTs have demonstrated a benefit associated with treatment of postural hypotension in addition to interventions such as medication reduction, optimization of fluids, and behavioral intervention.<sup>19,20,23</sup>

### Managing Heart Rate and Rhythm Abnormalities

The most common cardiovascular disorders associated with falls are carotid sinus hypersensitivity, vasovagal syndrome, bradyarrhythmias (e.g., sick sinus syndrome and atrioventricular block), and tachyarrhythmias. Two mechanisms have been proposed. The first is transient loss of consciousness with amnesia in which the patient has no recollection of short episodes of syncope; this has been reported with postural hypotension and carotid sinus hypersensitivity.<sup>53</sup> Given that up to 70% of falls in older persons are not witnessed, these patients may present with a report of a fall rather than syncope. A second proposed mechanism is that of transient hypotensive episodes, due to primary hypotension or hypotension secondary to arrhythmias, which cause a person with comorbid gait and balance instability to lose balance and fall without frank syncope. Cardiac pacing treats bradycardia. One RCT of cardiac pacing in community-dwelling older people who had recurrent unexplained falls, reported a significant reduction in fall rates at 12-month follow-up.<sup>54</sup> For the subset of older adults who meet the necessary diagnostic criteria, dual-chamber cardiac pacing for bradyarrhythmias (including carotid sinus hypersensitivity and conduction disorders) and treatment of tachyarrhythmia are components of a multifactorial intervention designed to reduce the risk for falls.

### Vitamin D Supplementation

Vitamin D deficiency is common in older people and when present impairs muscle strength and possibly neuromuscular function. Several recent meta-analyses and RCTs have shown a beneficial effect of vitamin D supplementation in fall prevention distinct from its effect on bone health.<sup>55-60</sup> Some of these trials have also shown benefit even in older persons with normal serum vitamin D levels. Given the low number needed to treat of 15 and the evidence of significant fall risk reduction, as well as the fact that vitamin D is safe and inexpensive, older persons with suspected vitamin D deficiency should be routinely offered supplementation to reduce fall risk. Moreover, vitamin D supplementation at appropriate levels should also be considered for all older adults.

### Managing Foot and Footwear Problems

Foot problems are common in older people and are associated with impaired balance and performance in tests of function. Serious foot problems (moderate or severe bunions, toe deformities, ulcers or deformed nails) predispose older adults to falls.<sup>12</sup> Also, foot position awareness is significantly poorer in older persons.

The type and condition of footwear may also contribute to the risk of falling. Footwear that fits poorly, has worn soles, has high heels, or is not laced or buckled when worn has been associated with a higher risk of falling.<sup>61</sup> Shoes with low heel height and high surface contact area may reduce the risk for falling.<sup>62-65</sup> Most of the studies that implemented a multifactorial assessment for reducing the risk of falling, included a foot assessment coupled with advice or referral for appropriate treatment, if any foot problems were identified.<sup>27,29,66,67</sup> (See Multifactorial Intervention.) Assessment and recommendations for use of appropriate shoes were also included in home hazards studies.<sup>51,68</sup> One small study found that antislip shoe devices were effective in reducing outdoor falls in slippery conditions.<sup>69</sup>

### Modification of the Home Environment

Environmental hazards are any objects or circumstances in the environment that increase an individual's risk of falling and may be within the home and grounds (commonly termed home falls hazards) or away from the home (public falls hazards). Identification and mitigation of environmental hazards has been a recommended component of many successful fall prevention programs. The panel concluded that screening of the home environment with follow-up for any needed modifications by a healthcare professional is an effective targeted intervention for people with a previous fall history or other fall risk factors. Programs include home hazard assessments by trained individuals, removal or modification of identified hazards, installation of safety devices such as handrails on stairs and grab bars on bathrooms, and improvements in lighting.

Although evidence supporting the use of home environment assessment and intervention alone as a strategy to reduce falls in community-dwelling older adults is mixed (not supportive,<sup>24,70</sup> supportive<sup>71</sup>), evidence for home environment assessment and intervention as part of a multifactorial fall prevention program is strong.<sup>19-21,23-27,31,32,35-37,72,73</sup> Further insights regarding effectiveness of the interventions are gained through the meta-analysis.<sup>15</sup> One RCT found particular benefit in high-risk frail older subjects with a falls history.<sup>30</sup>

### Providing Education and Information

All fall prevention programs include educational and health promotion components. Education of patient and caregiver can be considered as primary and secondary prevention measures and is also important for implementation and sustained use of fall prevention strategies. Many effective programs include opportunities for older adults to access fall prevention resources (e.g., durable medical equipment, local exercise programs) and to take specific actions that maintain or improve health or build fall prevention skills

(e.g., transferring safely into the bathtub, learning how to use mobility devices).

Specific educational goals may be considered fundamental components of fall prevention interventions (e.g., increasing older adults' activity level, improving ability to identify and mitigate fall hazards in the home, and providing information to make good choices about footwear); however, there is little evidence to determine the incremental benefit of such educational input on fall rates in a multicomponent intervention<sup>27,30,37,70,74</sup> or as a sole fall prevention intervention.<sup>31,66,67,75</sup> In one RCT of a cognitive-behavioral falls prevention program, "Stepping On," that was part of a multicomponent community-based program, falls were 31% lower in the intervention group.<sup>21</sup>

### OLDER PERSONS IN LONG-TERM CARE FACILITIES

Falling is more frequent in ambulatory residents of long-term care facilities than in older persons residing in the community. Approximately half of ambulatory long-term care residents experience at least one fall each year.

Trials in long-term care facilities have addressed single interventions administered alone and multiple interventions administered together.<sup>76</sup> Single interventions include use of hip protectors, fall alarm devices, removal of physical restraints, medication review, and supplementation with calcium and vitamin D. Many factors, such as variation in type and severity of disability of residents, differences in structure of care and terminology used to describe facilities, lack of information about the cognitive or physical functioning of participants, and insufficient description of the interventions, complicate interpretation of the evidence from RCTs in the long-term care setting.

### Multicomponent Interventions

These are the most commonly studied strategies in long-term care settings. "Targeted" or "customized" multifactorial interventions have also been tested. Staff training and feedback, environmental adaptations, balance and gait training, strength training, training in the use of appropriate assistive devices, and decrease in psychotropic medications are interventions that have frequently been included in multicomponent intervention and multifactorial trials in this setting. The effectiveness of multicomponent studies in reducing falls in long-term care is uncertain. Three<sup>77-79</sup> of the eight trials of multiple component interventions were effective in reducing fall risk; the others found no significant effects.<sup>38,51,80-82</sup> Medication review as part of a multicomponent intervention has provided inconclusive evidence as to whether medication assessment, adjustment, and discontinuation results in fewer falls.<sup>51,78,79</sup>

Environmental components were included in six of the eight studies of multicomponent interventions in the long-term care setting, of which three studies were ineffective<sup>51,78,80</sup> and three effective.<sup>76,78,83</sup> Two RCTs incorporating multifactorial interventions and achieving significant reductions in falls incorporated environmental assessment and modifications.<sup>77,78</sup> No data were reported on the effectiveness of the environmental modifications alone.

The education of long-term care staff has resulted in mixed results but has probably contributed to reduction of

falls in some large studies. Some evidence supports the effectiveness of healthcare team training in awareness and prevention strategies, although several multifactorial studies failed to show significant reduction in falls.

### Exercise

Although exercise may provide certain benefits for long-term care residents, particularly in terms of quality-of-life parameters, confounding variables (differences in frailty levels, cognitive function, prior falls history, small size of many studies) mitigate against clearly defined conclusions.<sup>81,84-89</sup> Some studies found a greater risk of falls with exercise.<sup>85</sup> There are currently no clinical RCTs to recommend, for or against, the use of individually customized exercise programs to prevent falls in long-term care settings.

### Vitamin D

Studies from meta-analyses and recent RCTs support the use of combined calcium and vitamin D3 supplementation to reduce fracture rates in older people in long-term care.<sup>55,90,91</sup>

### OLDER PERSONS WITH COGNITIVE IMPAIRMENT

Older people with cognitive impairment and dementia are at greater risk for falls, with an annual incidence of approximately 60%.<sup>12,92</sup> Cognitive impairment is an independent risk factor for falls. Mobility problems experienced with dementia are associated with falls, fractures, and admission to long-term care.

At this time, there is insufficient evidence to recommend, for or against, single or multifactorial interventions in community-living older adults with known cognitive impairment.<sup>13,82,83</sup> The only study that specifically investigated cognitive impairment in the community demonstrated lack of efficacy.<sup>82</sup>

Physical activity was evaluated for its effectiveness in reducing falls in a systematic review of 11 RCTs of cognitively impaired subjects. The investigators observed only limited effectiveness of physical training or exercise in reducing fall risk.<sup>13</sup>

A study of education as part of a multicomponent intervention program that included staff education, drug review, environmental adjustment, exercise, aids, hip protectors, and postfall problem-solving conferences observed that education was associated with a significant intervention effect on falls in the group with higher Mini-Mental State Examination scores but not in the group with lower scores.<sup>83</sup>

The effectiveness of a customized multicomponent intervention after multifactorial clinical assessment was investigated in older patients with cognitive impairment and dementia presenting to the emergency department after a fall.<sup>82</sup> Interventions included optical correction, medical assessment, physiotherapy, occupational therapy, and foot care. No significant difference between the intervention and control groups in fall risk was found.

## RECOMMENDATIONS: SCREENING AND ASSESSMENT

All older individuals should be asked whether they have fallen (in the past year).

1. An older person who reports a fall should be asked about the frequency and circumstances of the fall(s).
2. Older individuals should be asked whether they experience difficulties with walking or balance.
3. Older persons who present for medical attention because of a fall, report recurrent falls in the past year, or report difficulties in walking or balance (with or without activity curtailment) should have a multifactorial fall risk assessment.
4. Older persons who cannot perform or perform poorly on a standardized gait and balance test should be given a multifactorial fall risk assessment.
5. Older persons who report a single fall in the past year should be evaluated for gait and balance.
6. Older persons who have fallen should have an assessment of gait and balance using one of the available evaluations.
7. Older persons who have difficulty or demonstrate unsteadiness during the evaluation require a multifactorial fall risk assessment.
8. Older persons reporting only a single fall in the past year and reporting or demonstrating no difficulty or unsteadiness during the evaluation do not require a fall risk assessment.
9. A clinician (or clinicians) with appropriate skills and training should perform the multifactorial fall risk assessment.
10. The multifactorial fall risk assessment should include the following.

### A. Focused History

- (i) History of falls: detailed description of the circumstances of the fall(s), frequency, symptoms at time of fall, injuries, other consequences
- (ii) Medication review: all prescribed and over-the-counter medications with dosages
- (iii) History of relevant risk factors: acute or chronic medical problems (e.g., osteoporosis, urinary incontinence, cardiovascular disease)

### B. Physical Examination

- (i) Detailed assessment of gait, balance, and mobility levels and lower extremity joint function
- (ii) Neurological function: cognitive evaluation, lower extremity peripheral nerves, proprioception, reflexes, tests of cortical, extrapyramidal and cerebellar function
- (iii) Muscle strength (lower extremities)
- (iv) Cardiovascular status, heart rate and rhythm, postural pulse and postural blood pressure, and if appropriate heart rate and blood pressure responses to carotid sinus stimulation
- (v) Assessment of visual acuity
- (vi) Examination of the feet and footwear

### C. Functional Assessment

- (i) Assessment of activity of daily living skills, including use of adaptive equipment and mobility aids, as appropriate

- (ii) Assessment of the individual's perceived functional ability and fear related to falling (assessment of current activity levels with attention to the extent to which concerns about falling are protective (appropriate given abilities) or contributing to deconditioning or compromised quality of life (individual is curtailing involvement in activities he or she is safely able to perform due to fear of falling))

## D. Environmental Assessment

### INTERVENTIONS: OLDER PERSONS LIVING IN THE COMMUNITY

12. Direct interventions customized to the identified risk factors, coupled with an appropriate exercise program should follow the multifactorial fall risk assessment. [A]
13. A strategy to reduce the risk of falls should include multifactorial assessment of known fall risk factors and management of the risk factors identified. [A]
14. The components most commonly included in efficacious interventions were:
  - (a) Adaptation or modification of home environment [A]
  - (b) Withdrawal or minimization of psychoactive medications [B]
  - (c) Withdrawal or minimization of other medications [C]
  - (d) Management of postural hypotension [C]
  - (e) Management of foot problems and footwear [C]
  - (f) Exercise, particularly balance, strength, and gait training [A]
15. All older adults who are at risk of falling should be offered an exercise program incorporating balance, gait, and strength training. Flexibility and endurance training should also be offered but not as sole components of the program. [A]
16. Multifactorial or multicomponent interventions should include an education component complementing and addressing issues specific to the intervention being provided, customized to individual cognitive function and language. [C]
17. The health professional or team conducting the fall risk assessment should directly implement the interventions or ensure that other qualified healthcare professionals conduct the interventions. [A]
18. Psychoactive medications (e.g., sedative hypnotics, anxiolytics, antidepressants) and antipsychotics (e.g., new antidepressants or antipsychotics) should be minimized or withdrawn, with appropriate tapering if indicated. [B]
19. A reduction in the total number of medications or dose of individual medications should be pursued. All medications should be reviewed and minimized or withdrawn. [B]
20. Exercise should be included as a component of multifactorial interventions for fall prevention in community-residing older persons. [A]
21. An exercise program that targets strength, gait, and balance, such as tai chi or physical therapy, is recommended as an effective intervention to reduce falls. [A]

22. Exercise may be performed in groups or as individual (home) exercises because both are effective in preventing falls. [B]
23. Exercise programs should take into account the physical capabilities and health profile of the older person (i.e., be customized) and be prescribed by qualified health professionals or fitness instructors. [I]
24. The exercise program should include regular review, progression, and adjustment of the exercise prescription as appropriate. [I]
25. In older women in whom cataract surgery is indicated, surgery should be expedited because it reduces the risk of falling. [B]
26. There is insufficient evidence to recommend for or against the inclusion of vision interventions within multifactorial fall prevention interventions. [I]
27. There is insufficient evidence to recommend vision assessment and intervention as a single intervention for the purpose of reducing falls. [D]
28. An older person should be advised not to wear multifocal lenses while walking, particularly on stairs. [C]
29. Assessment and treatment of postural hypotension should be included as components of multifactorial interventions to prevent falls in older persons. [B]
30. Dual-chamber cardiac pacing should be considered for older persons with cardioinhibitory carotid sinus hypersensitivity who experience unexplained recurrent falls. [B]
31. Vitamin D supplements of at least 800 IU per day should be provided to older persons with proven vitamin D deficiency. [A]
32. Vitamin D supplements of at least 800 IU per day should be considered for people with suspected vitamin D deficiency or who are otherwise at high risk for falls. [B]
33. Identification of foot problems and appropriate treatment should be included in multifactorial fall risk assessments and interventions for older persons living in the community. [C]
34. Older people should be advised that walking with shoes of low heel height and high surface contact area may reduce the risk of falls. [C]
35. Home environment assessment and intervention performed by a healthcare professional should be included in a multifactorial assessment and intervention for older persons who have fallen or who have risk factors for falling. [A]
36. The intervention should include mitigation of identified hazards in the home and evaluation and interventions to promote the safe performance of daily activities. [A]
37. Education and information programs should be considered part of a multifactorial intervention for older persons living in the community. [C]
38. Education should not be provided as a single intervention to reduce falls in older persons living in the community. [D]
39. There is insufficient evidence to recommend for or against multifactorial or multicomponent interventions in long-term care settings. [C]
40. Exercise programs should be considered for a variety of benefits to reduce falls in older persons living in long-term care settings (with caution regarding risk of injury), although their effect on fall risk in these settings is unproven. (C)
41. Vitamin D supplements of at least 800 IU per day should be provided to older persons residing in long-term care settings with proven or suspected vitamin D insufficiency. [A]
42. Vitamin D supplements of at least 800 IU per day should be considered in older persons residing in long-term care settings who have abnormal gait or balance or who are otherwise at high risk for falls. [B]
43. There is insufficient evidence to recommend for or against multifactorial or single interventions to prevent falls in older persons with known dementia living in the community or in long-term care facilities. [I]

## ACKNOWLEDGMENTS

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The following organizations endorsed the Clinical Practice Guideline for the Prevention of Falls in Older Persons: The American College of Emergency Physicians, the American Medical Association, the American Occupational Therapy Association, and the American Physical Therapy Association.

Oded Susskind, MPH, Medical Education Consultant, Brookline, Massachusetts, provided guideline development facilitation. Sue Radcliff, Independent Researcher, Denver, Colorado, provided research services. Katherine Addleman, PhD, provided editorial services. Marianna Drootin, Elvy Ickowicz, MPH, and Nancy Lundebjerg, MPA, American Geriatrics Society, New York, New York, provided additional research and administrative support.

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