

## CLINICAL PRACTICE

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## Prevention of Falls in Community-Dwelling Older Adults

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*This Journal feature begins with a case vignette highlighting a common clinical problem. Evidence supporting various strategies is then presented, followed by a review of formal guidelines, when they exist. The article ends with the authors' clinical recommendations.*

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**A 79-year-old woman presents for her annual wellness visit. She reports having fallen 9 months ago and again a few weeks ago. She does not remember the details of the first fall, but for the second fall, she notes having tripped over uneven pavement while walking outside of her home. Despite some difficulty, she was able to get up unassisted and did not seek medical attention; she recalls having taken an over-the-counter “sleep aid” the night before. She said she has no fear of falling, dizziness, or loss of consciousness. Office staff perform a Timed Up and Go test, and it takes her 15 seconds to complete the test ( $\geq 12$  seconds indicates an increased risk of falls). How would you evaluate this patient and manage the risk of future falls?**

### THE CLINICAL PROBLEM

FALLS, DEFINED AS “AN UNEXPECTED EVENT IN WHICH THE PARTICIPANTS come to rest on the ground, floor, or lower level,”<sup>1</sup> occur at least once annually in 29% of community-dwelling adults 65 years or older — a rate of 0.67 falls per person per year.<sup>2</sup> Population-based studies suggest that 10% of older adults fall at least twice annually<sup>3</sup>; patients regularly visiting clinician offices are presumed to be more likely to belong to this high-risk group, given the prevalence of diseases and impairments that increase the risk of falling. After falling, a quarter of older adults restrict their activity for at least a day or seek medical attention.<sup>2</sup> More serious injuries, such as fractures, joint dislocations, sprains or strains, and concussions, occur in approximately 10% of falls.<sup>4</sup> Rhabdomyolysis due to muscle ischemia can develop in persons who are unable to get up after a fall and are “found down” after a long period. After a fall, a fear of falling develops in 21 to 39% of those who previously had no such fear; persons who fear falling may restrict their activity and have a reduced quality of life.<sup>5</sup> In aggregate, fall injuries lead to 2.8 million emergency department visits and 800,000 hospital stays in the United States annually,<sup>2</sup> with total health care costs of \$49.5 billion.<sup>6</sup>

Most falls result from a combination of intrinsic risks (e.g., balance impairment) and extrinsic risks (e.g., trip or slip). Given the many contributors to the risk of falls,<sup>7</sup> focusing on the factors that are the final common pathways to falls and are those most commonly evaluated in randomized trials leads to a core set of risk factors (Table 1).<sup>3,29</sup> Deficits in gait and balance are the most prominent predisposing risk factors at the population level. Medications (including over-the-counter drugs), alcohol, visual deficits, impairments in cognition and mood, and environ-



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## KEY CLINICAL POINTS

## PREVENTION OF FALLS IN COMMUNITY-DWELLING OLDER ADULTS

- Falls are common among community-dwelling older adults and can lead to physical injury, psychological harm, or both.
- Falls often result from interacting risks that can be reduced or managed.
- Because older adults may not spontaneously mention falls, asking annually about falls in the past year is recommended to identify persons at high risk for future falls.
- Community-based and home-based exercise programs focused on balance and strength training are effective in reducing the risk of falls among older adults at average or high risk.
- For persons at high risk for falls (e.g., two or more falls in the past year), assessing a standard set of risk factors for falls and intervening to address modifiable risk factors reduces the likelihood of subsequent falls.
- Treatment of osteoporosis is important to reduce the risk of fall-related fractures.

mental hazards can also contribute. Because some syncopal events manifest as unexplained falls, cardiovascular disease can also play a role.<sup>30</sup>

The propensity for fall-related harm depends on the risks of both falls and injury on impact. Osteoporosis is an important contributing cause of fall-related fractures, and the incidence of osteoporotic fractures increases progressively with age.<sup>31</sup> Patients receiving anticoagulation therapy are also at increased risk owing to a modest absolute increased risk of fall-related bleeding.<sup>32</sup>

## STRATEGIES AND EVIDENCE

## EVALUATION

The guidelines of the American Geriatrics Society and the British Geriatrics Society recommend annual screening for the risk of falls among patients 65 years of age or older,<sup>27</sup> because patients often do not volunteer information about a previous fall.<sup>33</sup> Screening questions about the number of falls in the past year and about whether a fear of falling limits daily activities can be asked as part of a previsit questionnaire or during the intake interview.<sup>34</sup> Trained office staff can also perform the Timed Up and Go test to assess mobility (see the Supplementary Appendix, available with the full text of this article at NEJM.org); times of 12 seconds or longer are considered to indicate an increased risk of falls.<sup>34</sup> Patients who report a history of falls should be asked for further information about predisposing factors (e.g., medication and alcohol use), precipitating factors (e.g., preceding symptoms), circumstances of the fall, associated loss of consciousness or injuries, and whether

they sought medical attention. Patients with suspected syncope or cardiac symptoms preceding a fall should be referred for cardiac evaluation.

Simple office-based tests of gait, balance, and strength are routinely indicated in patients who have a positive screening result for a history of falls or a fear of falling that limits daily activities. A history of two falls or more in the past year, a visit to an emergency department for a fall in the past year, or a fall in the past year combined with an overt balance or walking problem (e.g., positive Timed Up and Go test) are markers of high risk warranting multifactorial intervention (Fig. 1).

## MANAGEMENT

*Exercise*

All patients should be encouraged to exercise, if they can. A meta-analysis of 59 randomized trials, which included both healthy participants and those with chronic conditions who were recruited from generalist and specialist outpatient clinics, supports the benefits of fall-prevention exercise in those at average or high risk for falls.<sup>35</sup> The rate of falls was 23% (95% confidence interval [CI], 17 to 29) lower among the participants in the exercise groups than among those in the control groups (who received interventions not thought to reduce falls and who had, on average, 0.85 falls per person per year); the participants in the exercise groups had 0.20 fewer falls per person per year.<sup>35</sup> More limited evidence suggests that exercise may reduce the number of falls resulting in fractures (10 trials showed a 27% [95% CI, 5 to 44] lower rate with exercise than with control interventions) and falls resulting in medical attention (5 trials showed a

**Table 1. Risk Factors for Falls That Are Commonly Evaluated in Randomized Trials of Multifactorial Interventions.\***

Risk Factor	Odds Ratio for Any Falls (95% CI)	Prevalence Measure	Prevalence in Older Adult Cohorts (%)†	Underlying Impairment Leading to Falls
Balance impairment <sup>8</sup>	1.98 (1.60–2.46)	Balance problem (modified Romberg test) <sup>17</sup>	Point estimate, 58	Sensory impairment (visual, vestibular, or somatosensory), delayed reaction time, or muscle weakness <sup>7</sup>
Gait problems <sup>9</sup>	2.06 (1.82–2.33)	Gait speed <0.6 m per second <sup>19</sup>	Point estimate, 35‡	Difficulty in negotiating obstacles or ascending or descending stairs <sup>7</sup>
Visual impairment <sup>9</sup>	1.35 (1.18–1.54)	Functional visual impairment <sup>20</sup> §	Point estimate, 10	Impairments in depth perception or in sensitivity to visual contrasts <sup>7</sup>
Orthostatic hypotension <sup>10</sup> ¶	1.50 (1.15–1.97)	Orthostatic hypotension <sup>18</sup>	95% CI of prevalence, 17–28	Transient cerebral hypoperfusion leading to light-headedness and loss of balance or loss of consciousness; may present as falls rather than syncope if the patient is amnesic after regaining consciousness <sup>27</sup>
Medication		≥5 Prescription medications <sup>21</sup>	Point estimate, 39	Sedation, confusion, orthostatic hypotension, or ataxia <sup>11,12,28</sup>
Polypharmacy <sup>12</sup>	1.75 (1.27–2.41)			
Antipsychotics <sup>11</sup>	2.30 (1.24–4.26)			
Antidepressants <sup>11</sup>	1.48 (1.24–1.77)			
Benzodiazepines <sup>11</sup>	1.40 (1.18–1.66)			
Loop diuretics <sup>13</sup>	1.36 (1.17–1.57)			
Environment				Interaction between functional limitations and home environment, <sup>7</sup> with hazards (e.g., trip hazards or poor lighting) acting as a precipitating cause
Physical disability <sup>9</sup>	1.56 (1.22–1.99)	Difficulty with any ADL <sup>22</sup>	Range of point estimates, 20–27	
Instrumental disability <sup>9</sup>	1.46 (1.20–1.77)	Difficulty with any IADL <sup>22</sup>	Range of point estimates, 16–18	
Home hazards <sup>14</sup>	1.15 (0.97–1.36)	≥2 Home hazards <sup>24</sup>	Point estimate, 91	
Cognitive impairment <sup>15</sup>	1.32 (1.18–1.49)	Dementia <sup>23</sup>	Point estimate, 9	Impairments in executive function (e.g., planning, reasoning, or self-regulation) <sup>15</sup>
Depressive symptoms <sup>16</sup>	1.49 (1.24–1.79)	Depressive disorders <sup>25</sup>	95% CI of prevalence, 10–26	Decreased mental processing speed, psychomotor retardation, or loss of confidence leading to avoidance of activity <sup>16</sup>

\* Data on risk factors were obtained from meta-analyses of observational studies.<sup>8–16</sup> The limitations of these data include considerable heterogeneity across studies in their definitions of risk factors for falls and evidence of publication bias in some cases. Also, the odds ratio is known to overestimate the relative risk when the outcome of interest is common (as in the case of falls). These data are shown to provide a general context for the increased risk of falls associated with each risk factor among older adults. ADL denotes activity of daily living (includes bathing, dressing, eating, transferring, walking, and toileting), and IADL instrumental activity of daily living (includes preparing meals, shopping, managing money, and using the telephone).

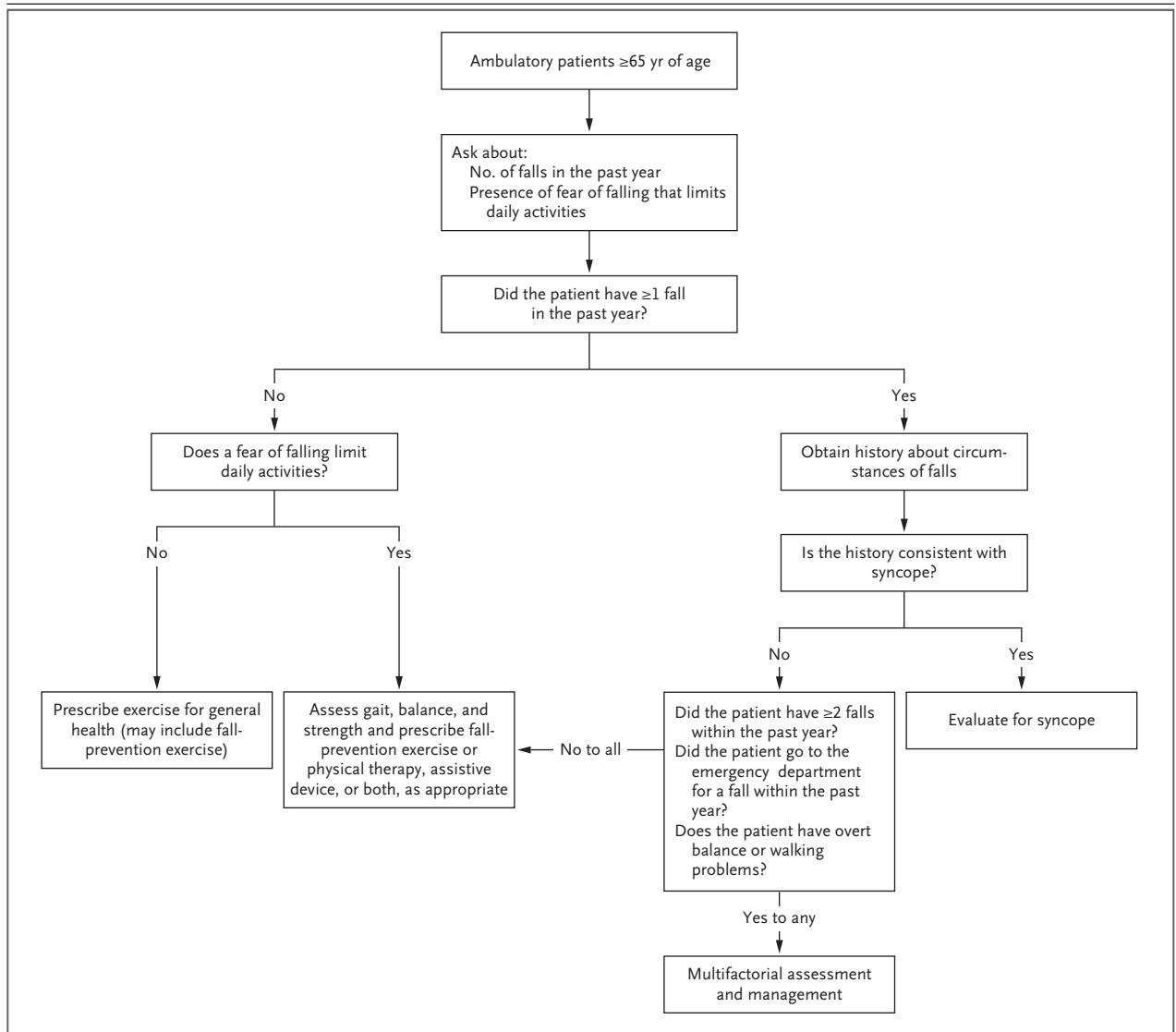
† Prevalence reflects point estimates or a range of point estimates from population-based studies involving older adults or the 95% confidence intervals of the prevalence from meta-analyses. Data are shown for cohorts of adults 60 years of age or older,<sup>17,18</sup> 65 years of age or older,<sup>19,23</sup> 72 years of age or older,<sup>24</sup> and 75 years of age or older.<sup>25</sup>

‡ The prevalence estimate of 35% was derived from Table 1 of the study by Studenski et al.<sup>19</sup> (results of the Third National Health and Nutrition Examination Survey).

§ Functional visual impairment was defined as difficulty in seeing the words or letters in ordinary newspaper print.<sup>20</sup>

¶ Orthostatic hypotension was defined as a “sustained reduction in systolic blood pressure of at least 20 mm Hg or diastolic blood pressure of at least 10 mm Hg within 3 minutes of standing.”<sup>26</sup>

|| Examples of hazards include trip hazards (e.g., throw rugs and loose electrical cords), slippery areas, and poor lighting.



**Figure 1. Algorithm for Assessment and Management of the Risk of Falls.**

Shown is an algorithm designed for use in a general, older adult population. The focus is on the stratification of risk into the following three groups: persons at low risk for falls who should exercise for general health (but can participate in fall-prevention exercise if interested); persons at intermediate risk for falls, for whom it is reasonable to assess gait, balance, and strength in order to match them with an appropriate exercise or physical-therapy program, prescribe an assistive device, or both; and persons at high risk for falls who are candidates for multifactorial assessment and management, which includes assessment of gait, balance, and strength. Factors that are used for risk stratification are informed by inclusion criteria for randomized trials of multifactorial assessment and management,<sup>29</sup> prospective studies assessing the prognostic value of screening items,<sup>34</sup> and the need for an efficient approach in clinical practice.

39% [95% CI, 21 to 53] lower rate).<sup>35</sup> Most exercise programs lasted at least 12 weeks, and almost one third had a duration of at least 1 year.<sup>35</sup>

Both home-based exercise programs (e.g., the Otago Exercise Program [see the Supplementary Appendix]) and group-based exercise programs have been shown to reduce the rate of falls. The most effective programs have been specifically

designed to reduce the risk of falls and include exercises that improve leg strength and challenge balance with progressively more difficult activities.<sup>36</sup> There is also some evidence of a lower rate of falls with tai chi, with programs offering classes one to three times per week for 13 to 48 weeks (7 trials showed a 19% [95% CI, 1 to 33] lower rate with tai chi than with control

**Table 2. Common Domains of Multifactorial Assessment and Management.\***

Assessment Domain <sup>29</sup>	Assessment Strategy	Potential Interventions	Evidence from RCTs for Fall Outcomes
Balance, gait, strength	Watch the patient rise from a chair, walk, and stand with feet in side-by-side, semi-tandem, and full-tandem positions.	Group exercise in the community; home-based exercise program; outpatient physical therapy; home-based physical therapy; assistive device†	Systematic reviews of large numbers of RCTs strongly favor exercise (high certainty of evidence). <sup>36</sup>
Vision	Check for eye examination in the past 1 to 2 years, reports of new visual problems, and use of multifocal lenses (among those who regularly spend time outdoors).	Cataract surgery if indicated; prescription of single-lens distance glasses for outdoor use (only among people who regularly take part in outdoor activities)	One RCT (positive) exists for first-eye cataract surgery. <sup>37</sup> An RCT of single-lens distance glasses for outdoor use among current multifocal lens wearers showed no significant reduction in the rate of falls overall, but prespecified subgroup analyses showed a significantly lower rate of falls among those who regularly took part in outdoor activities (others had an increase in the rate of falls). <sup>38</sup>
Orthostatic hypotension	Assess orthostatic vital signs; proceed to medication review if vital signs are indicative of orthostatic hypotension.	Pharmacologic treatment (in severe cases)	Data from adequately powered RCTs showing benefits of pharmacologic treatment are lacking.
Medication	Review medications (assess for medicines without an indication; weigh risks and benefits of central nervous system-active medications).	Medication dose reduction or discontinuation	One RCT of psychotropic medication withdrawal showed a lower rate of falls in the medication-withdrawal group. <sup>39</sup> However, 47% of patients assigned to the medication-withdrawal group opted to resume their psychotropic medication 1 month after the conclusion of the trial (i.e., after the falls had been assessed).
Environment (e.g., home hazards or personal needs)	Assess basic and instrumental activities of daily living; perform a home-safety evaluation.	Home modification; adaptive equipment	RCTs have yielded inconsistent findings. <sup>40</sup> The evidence base for fall reduction in RCTs of home-safety assessment and modification and provision of adaptive equipment is strongest for high-intensity interventions and interventions targeted to high-risk groups. <sup>40</sup>
Cognition and psychological health	Use cognitive and depression screening tools (e.g., Mini-Cog and Patient Health Questionnaire-9).	If depression or dementia is identified, nonpharmacologic treatment is preferred with respect to fall risk; for dementia, ensure adequate supervision of the patient during daily activities	A systematic review of placebo-controlled RCTs of cholinesterase inhibitors and memantine showed no decrease in the number of falls and an increased risk of syncope in the group receiving cholinesterase inhibitors. <sup>41</sup> One placebo-controlled RCT of duloxetine for depression showed an increased risk of falling in the duloxetine group. <sup>42</sup> One RCT of a cognitive behavioral group intervention to reduce fear of falling showed no change in the rate of falls but showed fewer people with multiple falls. <sup>43</sup>

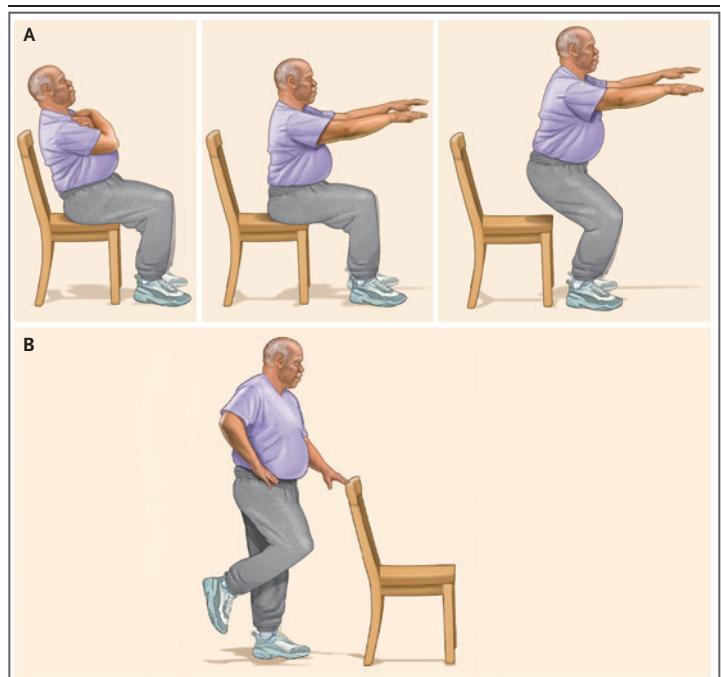
\* RCT denotes randomized, controlled trial.

† Group exercise in the community requires physical ability to travel outside of home and access to transportation. Also, most programs require people to stand independently and engage in at least 30 minutes of activity. A home-based exercise program can be an effective option if adequate training and progression are provided to ensure a safe and effective exercise dose (i.e., frequency, intensity, and duration of exercise). Outpatient physical therapy is an option for persons with moderate-to-severe deficits in gait, balance, or strength or other symptoms. (Additional details are provided in the algorithm in the Supplementary Appendix.) Home-based physical therapy must meet the definition for “home-bound” by the Centers for Medicare and Medicaid Services to be reimbursed through Medicare (i.e., “You need the help of another person or medical equipment such as crutches, a walker, or a wheelchair to leave your home, or your doctor believes that your health or illness could get worse if you leave your home”).

interventions).<sup>35</sup> Walking is often included in exercise programs but on its own has not been shown to prevent falls.<sup>36</sup> Persons with clinically significant balance impairments should avoid exercise programs that focus exclusively on brisk walking. Long-term adherence to exercise is difficult for most people, so patients should select an exercise option that they enjoy and can easily access and incorporate into their daily lives. Various fall-prevention exercise options that clinicians can offer to patients are noted in Table 2, and home exercises are shown in Figure 2. (Links to exercises and handouts are provided in the Supplementary Appendix.) Data are lacking to guide the clinician on which patients need further medical evaluation before initiating a fall-prevention exercise program. When in doubt, assessing gait, balance, and strength can help determine whether and in what type of program patients can safely exercise (e.g., in a community-based or unsupervised home-based exercise program or under the management of a physical therapist).<sup>36</sup> An algorithm to guide the selection of an exercise program is provided in the Supplementary Appendix.

#### *Multifactorial Assessment and Management*

Assessment of a standard set of risk factors for falls, with interventions based on the risks identified, is recommended in high-risk patients.<sup>27</sup> In a meta-analysis of 19 trials, the rate of falls was lower with multifactorial assessment and management than with usual care or an intervention not thought to reduce falls (1.8 vs. 2.3 falls per person per year), representing a 23% (95% CI, 13 to 33) lower rate of falls.<sup>44</sup> No significant between-group differences in favor of multifactorial assessment and management were observed in the risk of falls requiring medical attention or hospitalization or in the risk of fall-related fractures, but the statistical power was limited for evaluating these outcomes; with respect to fall-related fractures (9 trials), the relative risk was 27% lower (95% CI, -1 to 47) with multifactorial assessment and management than with usual care or an intervention not thought to reduce falls.<sup>44</sup> Studies of multifactorial assessment and management have assessed a number of different risk factors and provided different interventions.<sup>44</sup> Here, we focus on the most commonly assessed risk factors.<sup>29</sup> In Table 2, we re-



**Figure 2. Home-Based Exercises for Leg Strengthening and Balance.**

Panel A shows a home-based leg-strengthening exercise based on the Go4Life program developed by the National Institute on Aging. Patients can use their arms to assist with standing, if needed, and progress to standing with arms outstretched as illustrated for two sets of 10 to 15 repetitions. Panel B shows a home-based exercise to improve balance based on the Go4Life program. Patients should stand on one foot behind a sturdy chair, holding on to the chair for balance, and attempt to hold the position for up to 10 seconds. The exercise is repeated 10 to 15 times for each leg. Specific instructions for patients and links to additional exercises are available in the Supplementary Appendix.

view these risk factors and data from randomized, controlled trials to provide information on the effects of various interventions.

Because the performance of multifactorial assessment and management is time-intensive, a modular approach that spreads the assessment over multiple office visits can be helpful. The order of the evaluation should be informed by concerns raised by the patient or caregivers or identified through the medical history or physical examination. Some information may be available in the medical record (e.g., a recent eye examination). Resources related to the evaluations described below are provided in the Supplementary Appendix.

#### *Gait, Balance, and Strength*

Assessment of gait, balance, and strength is an important early step in the evaluation, because

this information can be used to match a patient with an exercise program, including physical therapy if needed. The assessment, which generally takes 5 minutes,<sup>45</sup> includes watching the patient walk to assess gait speed and any obvious gait abnormalities; testing balance by asking the patient to stand with feet in side-by-side, semi-tandem, and full-tandem positions; and watching the patient rise from a chair of normal height without using the hands to push off. On the basis of clinical experience, a visibly slow gait speed (e.g., <0.6 m per second)<sup>46</sup> or any discernible gait abnormalities, difficulties holding side-by-side or semi-tandem stances for 10 seconds, preexisting use of an assistive device, or inability to rise from a chair may indicate the need for either home-based physical therapy or outpatient physical therapy. Prescriptions for physical therapy should specify any gait, balance, or strength deficits noted during this part of the examination. Patients may also benefit from physical therapy if they have substantial musculoskeletal pain, neurologic or vestibular symptoms, or cognitive impairment that would limit participation in standard exercise programs. Patients without appreciable deficits are potentially appropriate for a community-based or home-based exercise program focused on fall prevention. Patients with balance deficits who do not have an assistive device should be encouraged to use a cane, wheeled walker, or both, which can be kept in the clinic for demonstration purposes.

#### Medication Review

All prescribed and over-the-counter drugs should be reviewed, with a focus on tapering or discontinuing medications without a compelling indication or for which the potential harm is greater than the benefit.<sup>28</sup> Particular attention should be paid to medications that may cause sedation, confusion, or orthostatic hypotension (e.g., antidepressants, antipsychotics, benzodiazepine-receptor agonists, antiepileptic drugs, opioids, and antihypertensive agents)<sup>11,13,28</sup> and medications that may interact with alcohol use. Resources are available to support clinicians in stopping or reducing the dose of medications that increase the risk of falls and to help patients in the tapering of such drugs. For patients who are tapering their use of insomnia medications, nonpharmacologic strategies (e.g., cognitive behavioral therapy and guidance on sleep hygiene) are available.

#### Functional Status and Home Safety

This assessment starts with identifying patients' limitations in basic and instrumental activities of daily living; patients with limitations can be queried about whether they have the necessary adaptive equipment (e.g., a shower chair for bathing) or someone to assist them. For patients with difficulties in basic activities of daily living, a home-safety evaluation ordered through a home-health agency is appropriate among those who are eligible. Although Medicare does not currently cover the cost of home modifications identified through a home-safety evaluation, for patients with limited means, community agencies and some municipalities may provide assistance with home modifications at little or no cost.<sup>47</sup> Medicare covers a part of the costs for some adaptive equipment (i.e., durable medical equipment prescribed by a physician). Most developed countries provide some support for home modifications and adaptive equipment for older people with limited means through a variety of funding approaches, including health care systems, charitable organizations, and tax refunds.

#### Vision

Eye examinations are recommended every 1 to 2 years for adults 65 years of age or older. Regarding patients who have not had a recent eye examination or who report new visual problems, distance vision can be tested in the office, and prompt referral can be made in the case of newly identified deficits in visual acuity. Patients with balance deficits who wear multifocal lenses and regularly go outdoors may also benefit from a referral for single-lens distance glasses to use when outdoors.<sup>38</sup> For patients with a corrected visual acuity worse than 20/80 in the better eye, a home assessment by an occupational therapist is recommended on the basis of a lower rate of falls observed among such patients who received a home-safety program than among those who did not; a lower rate of falls was not observed among those who received an exercise program.<sup>48</sup>

#### Cognition and Mood

Brief instruments, such as the Mini-Cog<sup>49</sup> and the Patient Health Questionnaire-9,<sup>50</sup> are helpful screening tools to assess cognitive impairment and depressive symptoms, respectively. Both of these conditions are associated with an increased risk of falls, independent of the medications prescribed for them (Table 1). Patients who meet the criteria for dementia or depression can be

evaluated for reversible causes (e.g., hypothyroidism). Because antidepressants are associated with an increased risk of falls<sup>11</sup> and cholinesterase inhibitors with an increased risk of syncope,<sup>41</sup> nonpharmacologic treatments should be offered first; pharmacologic treatment should be prescribed only after weighing the benefit of treatment against the potential side effects, including fall risk.

#### Orthostatic Hypotension

Orthostatic hypotension is defined as a sustained fall in systolic blood pressure of at least 20 mm Hg or diastolic blood pressure of at least 10 mm Hg within 3 minutes of standing.<sup>26</sup> Patients who have a drop in blood pressure immediately on standing that normalizes by 3 minutes can be educated about rising slowly and not ambulating immediately after standing. In patients with confirmed orthostatic hypotension, potentially causative medications (e.g., those with anticholinergic side effects) that are not necessary should be discontinued, and adequate hydration should be encouraged. Patients with refractory symptoms or profound drops in blood pressure on standing (i.e., from supine hypertension to standing hypotension) should be evaluated (or referred for evaluation) for neurogenic causes and for potential pharmacologic treatment.

#### Other Strategies

Features of multifactorial assessment in some randomized trials have included assessment for cardiovascular causes (e.g., carotid sinus hypersensitivity or arrhythmia), footwear or foot problems, hearing, musculoskeletal pain, neurologic findings (e.g., parkinsonism or peripheral neuropathy), urinary incontinence, and vestibular disorders.<sup>29</sup> These areas should be pursued as dictated by the circumstances of the patient's falls that were identified during the initial evaluation.

#### Vitamin D

Although previous studies showed that the risk of falls was lower with vitamin D supplementation than with control interventions, a recent systematic review of randomized trials of vitamin D (or analogues) to reduce the risk of falls among community-dwelling older adults who had no other indications for vitamin D supplementation did not support a benefit, with five trials showing no difference in the risk of falls,

one trial showing a decrease in the risk of falls, and one trial showing an increase in the risk of falls.<sup>29</sup> Thus, prescribing vitamin D expressly to prevent falls is not recommended.<sup>51</sup>

#### Injury Prevention

Injury prevention should focus on assessing and managing a patient's risk of fractures. Patients with previous vertebral or hip fracture after minimal trauma should be offered pharmacologic treatment for osteoporosis, and women 65 years of age or older (or with other major risk factors for osteoporosis) without a previous vertebral or hip fracture should undergo testing of bone mineral density.<sup>52</sup> Hip protectors are not recommended for community-dwelling older adults, since a meta-analysis showed no difference in the risk of hip fractures in this population.<sup>53</sup>

### AREAS OF UNCERTAINTY

The effectiveness of multifactorial evaluation and management for reducing the risk of serious fall injuries has not been established; two large multicenter, pragmatic trials addressing this are under way (ClinicalTrials.gov number, NCT02475850, and Current Controlled Trials number, ISRCTN71002650).<sup>54,55</sup> Most trials of fall-reduction strategies have excluded cognitively impaired persons<sup>35,44</sup>; a meta-analysis of three trials involving patients with cognitive impairment supports the benefit of exercise,<sup>36</sup> but more data are needed in this population.

### GUIDELINES

Guidelines for the evaluation and management of the risk of falls have been published by the U.S. Preventive Services Task Force<sup>51</sup> and by the American Geriatrics Society and British Geriatrics Society.<sup>27</sup> The current recommendations are largely concordant with these guidelines.

### CONCLUSIONS AND RECOMMENDATIONS

The 79-year-old woman described in the vignette is at high risk for future falls, given that she had two falls in the past year and had a positive Timed Up and Go test. She should be observed getting up from a chair without using her hands and then walking, and her balance should be

evaluated by asking her to stand with her feet in side-by-side, semi-tandem, and full-tandem positions. If there are no major deficits, she can be referred to a community-based exercise program and prescribed a cane for outdoor walking. Medications for insomnia should be discouraged in favor of nonpharmacologic strategies. We would review other medications, confirm that she is independent in her basic and instrumental activities of daily living, refer her for an eye examination if she has not had one in the past 1 to 2 years, and review test results of bone mineral density (or refer her for testing if none were available). Reviews of orthostatic vital

signs, cognition, and mood are also warranted, either at the current visit or the next. The patient should understand that falls are not an inevitable part of aging and that the risk of falls can be markedly reduced if she addresses identified risk factors.

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