

Preventing falls and fall-related injuries in older people

Falls present a major, growing and neglected public health problem with devastating consequences for older individuals, their families and health care systems.

The recently published *World guidelines for falls prevention and management for older adults: a global initiative*¹ (Guidelines) is a comprehensive document that provides extensive recommendations with additional background materials available on an accompanying website. The Guidelines is a consensus document informed by systematic reviews and a Delphi process. This body of work demonstrates that much is known about what works in falls prevention but there is considerable complexity. The main message is that most falls occur due to a loss of balance while upright or walking, and the most important intervention to prevent this is exercise. Rare causes such as cardioinhibitory syncope are also described. The Guidelines includes important messages about the older person's perspective, and which interventions are effective in hospitals and residential aged care facilities.

The Guidelines¹ explicitly states that although we know what interventions are effective, we still need to know how best to implement these interventions in our busy health systems. This perspective article aims to provide a digestible version of the most important points from the Guidelines that may be applied in general health and medical settings. For some of the points, we have added our interpretation of additional scientific information that is relevant to a clinical audience. Some solutions need to be implemented outside of our health systems, such as through community awareness, promotion of lifelong exercise, and provision of safe accessible environments.

Following the Guidelines structure, which highlights the importance of tailored intervention rather than a detailed assessment, this article first discusses effective interventions and thereafter addresses assessment.

Ian D Cameron^{1,2} 

Susan E Kurrle³

Cathie Sherrington^{2,4}

Exercise

Exercise is the key intervention to prevent falls and fall injuries. The clear benefits of physical activity and exercise in the prevention and management of most conditions affecting older people (eg, frailty, sarcopenia, dementia, cardiovascular disease, chronic respiratory disease, diabetes, stroke and hip fracture) are highlighted in many previous reviews and guidelines, including the *World Health Organization (WHO) guidelines on physical activity and sedentary behaviour*.²

Exercise is defined as a "subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical

fitness is the objective".² Exercises shown to prevent falls primarily involve control of the body in space, such as while standing, and moving from sitting to standing to walking, that is, functional activities that older people need to be able to complete each day to maximise independence. Such exercises involve using body weight as resistance to improve strength, and gradually narrowing the base of support to improve balance. Priority exercises involve moving from sit to stand and undertaking activities to challenge balance. The evidence shows that improving balance should be prioritised and resistance training may be added.^{1,3} To ensure effectiveness and safety, exercises are tailored to individual abilities, and are progressive and ongoing. **Box 1** shows basic exercises for frail older people.^{4,5}

Medical practitioners should introduce the exercises, demonstrate them, and prescribe them for low risk older people. This use of evidence-based non-pharmacological treatment can be termed the "green prescription"⁶ or "social prescribing" of exercise.⁷ In the prescription are the exercises to be performed, and the individualised "dose" (sets and frequency specified).⁸ The older person's preferences and the risk of injury and other adverse effects should be considered and managed. Review and progression of intensity of the exercise is required. Intermediate and high risk older people, or older people with a recent significant injury, should be referred to an appropriate health professional providing exercise therapy, for example a physiotherapist or an exercise physiologist. Low risk older people may be encouraged to join a suitable local community exercise opportunity where available.

For maximum effect, the strength and balance exercise program should have three or more sessions per week.^{1,3} Programs lasting three to six months may be effective³ but ideally fall prevention programs should be lifelong. Unless exercise is continued, detraining occurs over three to six months.¹ This means that encouragement to adhere to exercise is important, and also suggests that a continuing exercise program will be required for many older people with disabilities or frailty to maintain benefit.

Careful attention should be given to factors that will improve adherence to the exercise program, such as a therapeutic alliance between the patient and the health care professional, individual exercise program adaptation, involvement of others (spouse or carer), and use of appropriate environments such as a gym, park, community centre or home. The goal should be to have a program that the older person may follow at home, or to identify a group exercise class that is appropriate, accessible and affordable. Medical practitioners may have an important role supporting older people to identify a suitable way to incorporate ongoing exercise into their days⁹ or may refer to others for this task.

¹ John Walsh Centre for Rehabilitation Research, Northern Sydney Local Health District, Sydney, NSW.

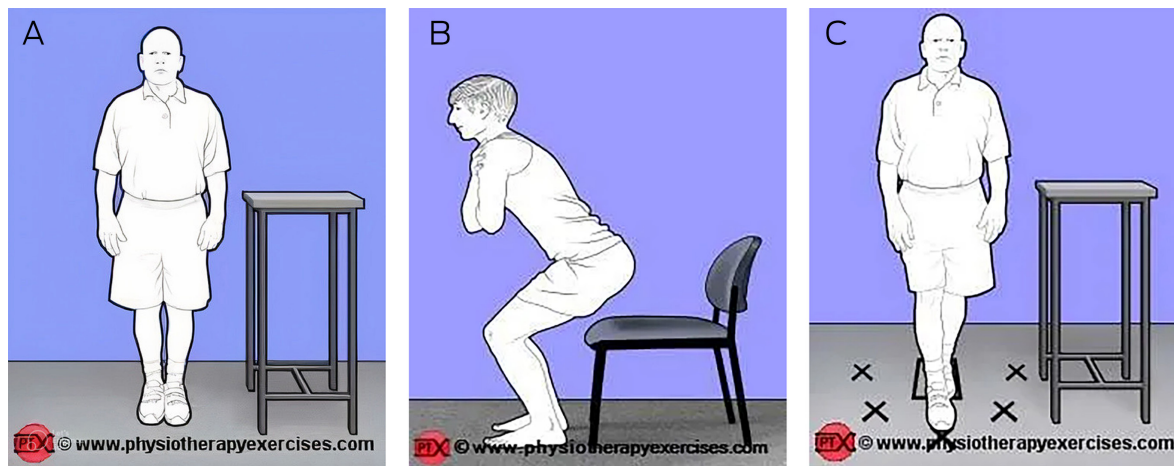
² University of Sydney, Sydney, NSW.

³ Hornsby Ku-ring-gai Hospital, Sydney, NSW.

⁴ Institute for Musculoskeletal Health, Sydney Local Health District, Sydney, NSW.

ian.cameron@sydney.edu.au

1 Basic exercises for fall prevention,⁴ showing (A) standing with feet together (with object to hold for safety if required), progressing to standing with one leg in front of the other, then standing on one leg if able; (B) sitting to standing (make easier with a higher chair, make harder with a lower chair or by holding a weight); and (C) stepping in different directions (hold on, if necessary, progress to stepping more quickly and further)



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Information about fall prevention is now more readily available. HealthPathways is an online health information portal designed for Australian general practice and primary health care professionals.¹⁰ The HealthPathways website provides information on falls assessment and interventions that are available to general practitioners and patients.

Other effective interventions

There are now many effective fall prevention interventions for specific health conditions. For example, we know that cataract surgery may prevent falls and fractures in affected individuals, and that podiatry intervention may prevent falls in people with foot pain.^{1,11} There is potential complexity as many factors can potentially contribute to falls, and the goal is to be aware of what these interventions are and consider whether they apply to the particular older person being assessed. The older person will need adequate information to consider the different intervention types. Their adherence with the intervention will be better if they understand and participate in formulation of the intervention plan.

Clinicians need a structure to consider the different health conditions causing falls. One approach is to consider a list of common concerns (Box 2), whereas another approach is to consider body systems and how changes in these lead to falls. This could be central nervous system (impaired cognition, and specific neurological conditions such as dementia, Parkinson disease and past stroke with disability), musculoskeletal (past fracture or significant injury, major foot problems, significant chronic arthritis), cardiovascular disease (hypotension, syncope), and impairment of vision and hearing. It is important to consider the significant external factors including

2 Examples of interventions for specific concerns

Concern	Intervention
Slow or unstable gait	<ul style="list-style-type: none"> Exercise program: <ul style="list-style-type: none"> ▶ balance and strength*
Older person excessively concerned about falling and limits activities	<ul style="list-style-type: none"> Cognitive behavioural approaches*
Fall with injury	<ul style="list-style-type: none"> Exercise program: <ul style="list-style-type: none"> ▶ balance and strength* ▶ improve bone health
Cognitive impairment or dementia	<ul style="list-style-type: none"> Exercise program: <ul style="list-style-type: none"> ▶ balance and strength* ▶ home and carer assessment
Parkinson disease or past stroke	<ul style="list-style-type: none"> Exercise program: <ul style="list-style-type: none"> ▶ balance and strength* ▶ optimise other treatment
Syncope or presyncope	<ul style="list-style-type: none"> Measure postural blood pressure and pulse Electrocardiogram Modify medication
Vision (and hearing) impairment	<ul style="list-style-type: none"> Assess further Measure visual acuity and consider audiogram, home assessment, cataract surgery if indicated
Multiple medication use	<ul style="list-style-type: none"> Assess with reference to <i>Falls Risk Increasing Drugs</i>¹² and deprescribe, if possible
Pain associated with activity limitation	<ul style="list-style-type: none"> Specific treatment for the pain (eg, interventions for painful feet) Exercise program Behavioural intervention*

* Consider referral to allied health professional where available, for example, exercise prescription from physiotherapist or exercise physiologist, home and community safety from occupational therapist, cognitive behavioural support from psychologist, foot care and exercises from podiatrist. ♦

medications (anticholinergics, psychotropics and opioids), the home environment (particularly if there has been recent hospitalisation or there is significant visual impairment), and discuss with and involve facility staff if the older person is living in a residential aged care facility.

Use of medications and deprescribing are controversial and complex. There is more to be learnt about optimal approaches but a reasonable approach is to reduce anticholinergic drugs, psychotropics (including antidepressants), and opioids, and to consider whether medications might be contributing to other problems such as cognitive difficulties and postural hypotension.^{1,13} The best medication intervention tool is unclear but STOPPfall¹² may be recommended.

Interventions in other situations

Dementia

Exercise is effective in people with dementia to prevent falls,^{1,14} but programs will need to be modified and supervised, and may be built into daily activities. Establishing an active daily routine with opportunities for exercise and social contact is effective as is modifying risks in the home environment. Where

funding is available, input from an occupational therapist, physiotherapist or exercise physiologist may establish and support these interventions.

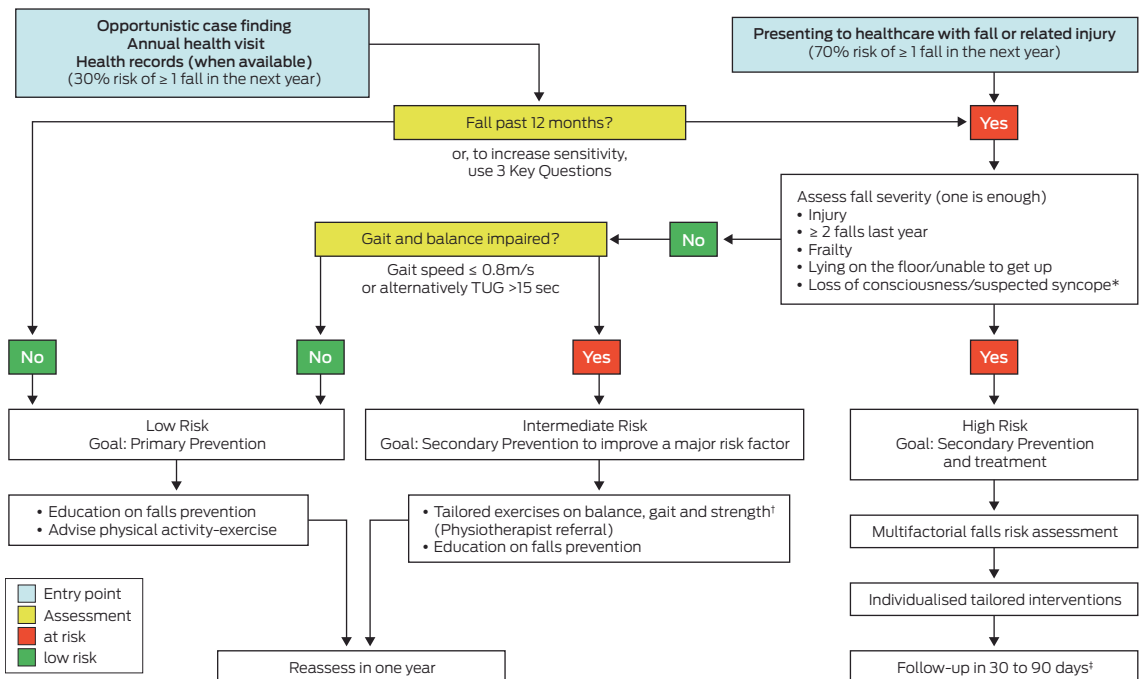
Hospitals

Hospital staff have spent a lot of time and effort applying falls risk screening tools such as STRATIFY¹⁵ to patients. However, a cluster randomised non-inferiority trial has shown that experienced health professionals are able to identify patients who are at a high risk of falls and may apply effective interventions.¹⁶ Clinicians did not assign risk scores and instead used clinical reasoning to select fall mitigation strategies using a decision support list. These include educational strategies and appropriate supervision (particularly in high risk activities such as toileting). Physical activity and opportunities for exercise should be encouraged. Bed rest and immobilisation should be avoided as these increase the risk of falling and deconditioning.

Residential aged care facilities

Almost all people living in residential aged care facilities will be vitamin D deficient unless taking a supplement.¹⁷ There is moderate evidence that vitamin D may prevent falls in these facilities.¹⁸ Exercise programs may be effective but need to be supervised

3 Algorithm for risk stratification, assessments, management and interventions for community-dwelling older adults¹



Notes: 3 Key Questions (3KQ) any positive answers to a) Has fallen in the past year? b) Feels unsteady when standing or walking? c) Worries about falling? Prompts to "fall severity" step. **Fall severity:** fall with injuries (severe enough to consult with a physician), laying on the ground with no capacity to get up, or a visit to the emergency room, or loss of consciousness/suspected syncope. **Frailty.** Commonly used frailty assessment tools include the Frailty Phenotype and the Clinical Frailty Scale.

*Syncope suspicion should trigger syncope evaluation/management. †Exercise on balance/leg strength should be recommended for the intermediate group. Evidence shows that challenging balance exercises are more effective for fall prevention. In several settings, this intermediate group is referred to a physiotherapist. ‡High risk individuals with falls can deteriorate rapidly, and close follow-up is recommended and should be guided on the frequency of consequent health service utilization. TUG: timed up and go test.

to enable people to stand up to exercise. Recently it has been shown that facility staff working closely with older people and their families may establish an effective falls prevention program in residential aged care.¹⁹ Programs also need to be ongoing as benefits are lost quickly once ceased.

Linking with other conditions

The interventions outlined in this article are beneficial in many health conditions in older people.² Therefore, in addition to reducing fall risk using these interventions, there is likely to be improvement in other conditions. An important aim is to address bone health in people with a high fall risk and who have had a past minimal trauma fracture. In addition to exercise, adequate vitamin D and dietary calcium, pharmacological treatment of established osteoporosis is beneficial with an established treatment gap.²⁰

Assessment

Previously too much attention has been given to assessment rather than intervention. People of all ages are at risk of falls with injury because walking and more complex mobility tasks are intrinsically risky. For older people, falls cause more severe injuries than for younger people. Ageing, disease and deconditioning decrease peoples' ability to recover from a trip or slip. Hip fracture and traumatic brain injury with hospitalisation (in an 85-year-old woman, the annual risks are about 3% and 0.5% respectively)^{21,22,23} are the greatest risks, but vertebral fractures and other lower extremity fractures also cause substantial morbidity and are associated with mortality.²⁴

Assessment is not difficult and is within the capability of all health professionals. Older people with gait and balance problems are at a substantially increased risk of falling. The best predictor of a future fall is a past fall.^{1,13} If further data are needed, gait velocity may be measured with walking at slower than 0.8 m/s indicating a higher fall risk.^{1,25}

The assessment algorithm shown in the diagram from the Guidelines [Box 3] stratifies risk as "high", "intermediate" and "low" and emphasises community exercise and education for the low risk groups (such as people falling less than once a year), and more specialised exercise with input from a health professional for those falling one to two times a year. For the high risk group (ie, those falling more than twice a year), individualised assessments and interventions with scheduled follow-up are recommended.

Conclusion

Falls and fall-related injuries may be reduced or prevented using specific exercise interventions involving balance and strength training. Older people at high risk of injury may benefit from a targeted approach that is likely to include exercise and other components, including appropriate management

of specific health conditions. The ageing of our population means our health systems need to quickly improve at preventing falls and subsequent injuries.²⁶

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