



General principles

- Regularly assess the older person's risk of falls (annually for those aged >70 years).
- Identify and manage medical conditions that contribute to falls.
- Recommend interventions to prevent falls.
- Recommend interventions to prevent injury in the event of a fall.
- Involve physiotherapists, occupational therapists, podiatrists, optometrists and audiologists when appropriate to help minimise falls risk.
- Regularly review medications, including a pharmacist review where appropriate.
- Strength and balance training under the supervision of a physiotherapist is an important intervention.
- Expedite necessary cataract surgery (first-eye cataract surgery).

Practice points

Practice points	References	Grade
A physiotherapist may be able to determine falls risk and provide important diagnostic information by undertaking a thorough gait and balance assessment, including activities such as Tai Chi, and balance and functional exercise programs	11	Consensus-based recommendation
Consider specific neurological conditions, cardiovascular diseases and vestibular diseases when investigating falls	3–10	Consensus-based recommendation
Consider pharmacological and non-pharmacological strategies for the prevention of falls and reduction of injury in the event of a fall	11	Consensus-based recommendation
Conduct a post-fall assessment after an older person has experienced a fall to identify any injuries, understand what may have caused the fall and importantly prevent or reduce the risk of further falls	11	Consensus-based recommendation

Introduction

A fall is an event that results in a person coming to rest inadvertently on the ground, floor or other lower level.¹

Physiological parameters (eg reaction time, body sway, quadriceps strength, vibration sense, visual contrast sensitivity) are significantly impaired in those who experience recurrent falls, compared with those who do not fall.

When an older person falls, the cause is frequently multifactorial, and requires a multidisciplinary approach to intervention. The risk of falling increases with the number of risk factors as detailed further.

Clinical context

Falls are a common health concern facing older people. An estimated one-third of older people aged >65 years who live in the community, half of older people aged >65 years who live in residential aged care facilities (RACFs), and half of older people aged >80 years in both the community and RACFs will fall each year.² Falls are more prevalent in people with dementia, especially those with Parkinson's dementia (refer to Part A. Dementia). Almost half of those who experience a fall will have a repeat fall within the next year. Injuries are higher due to the prevalence of underlying disease and reduced physiological reserve in older people. It is important to ask patients if they have experienced 'near falls' as well as falls.

A significant proportion of falls (40–60%) leads to injury, and a further 10–15% leads to serious injury, which may include hip fracture. Hip fracture has a significantly associated mortality rate – 10% die within a month, 20% within six months and 33% within a year.² Only a small number of older patients (~20%) regain full mobility after a fall.

Older people who fall are at risk of a 'long lie' because of the inability to get up from the fall without assistance, which can result in hypothermia, bronchopneumonia, dehydration, pressure injuries, rhabdomyolysis and, in some instances, death.

Falls are associated with a loss of confidence, functional decline, social withdrawal, anxiety and depression (refer to Part A. Mental health), increased use of medical services, and a fear of falling. An older person is at greater risk of institutionalisation following a fall.

Pathophysiology

Most falls are due to multiple interactions between an individual with a propensity to fall and other mediating factors.^{3,4} A recent Cochrane Review has found that a multi-component intervention may not be better than exercise alone for older people living in the community.⁵ However, it is widely acknowledged that there is a wide range of contributing factors to prevent falls, and a multi-component intervention may be necessary when appropriate.

Intrinsic factors

- Advanced age
- Central processing problems
 - Cognitive impairment
 - Vascular dementia and Lewy body dementia (greater risk due to gait disturbance)
 - Depression
- Neuromotor
 - Gait and balance disturbance
 - Parkinson's disease
 - Parkinson-like syndromes (eg progressive supranuclear palsy, multiple system atrophy, Lewy body dementia)
 - Stroke
 - Neuropathy
 - Muscle weakness

- Musculoskeletal
 - Chronic pain (refer to Part A. Pain)
 - Arthritis
 - Proximal myopathy (eg hypothyroidism)
- Vision impairment
 - Poor visual acuity
 - Poor depth perception
 - Poor contrast sensitivity
 - Need for rapid adjustment to vision, bifocal or multifocal lenses
- Cardiovascular
 - Orthostatic hypotension
 - Neurocardiogenic syncope
 - Arrhythmias
 - Valvular heart disease
- Other
 - Undernourishment
 - History of falls
 - Age – ≥ 80 years are particularly at risk
 - Female sex
 - Urinary incontinence (refer to Part A. Urinary incontinence)
 - Fear of falling

Extrinsic factors

- Inappropriate footwear
- Inappropriate clothing
- Physical and/or chemical restraint (refer to Part A. Behavioural and psychological symptoms of dementia)
- Cluttered environment
- Poorly lit environment
- Alcohol use
- Household pets
- Taking more than three medications (refer to Part A. Medication management), particularly
 - benzodiazepines
 - neuroleptics
 - antihypertensives
 - antidepressants
 - anticholinergics
 - Class 1A antiarrhythmic medications
 - hypoglycaemics.

In practice

Investigations

Office tests to assess falls risk

There are several office tests that can be used to assist in determining the risk of falls. If available, a physiotherapist, who will not only determine risk, but will also very often provide important diagnostic information, may be the best to undertake a thorough gait and balance assessment. Options for office tests include:

- observing the patient's gait
- Romberg test
- 'timed up and go' test
- single-leg stance
- sternal push
- shoulder tug test
- tandem gait or heel-toe walking
- functional reach
- ability to multitask
 - Walk and talk: Does the person need to stop walking to engage in conversation?
 - Perform simple arithmetic while walking: Does gait speed slow significantly?

Gait

- A good review of gait abnormalities is available through the [Stanford University website](#).
- Observe postural stability, steppage, stride length and sway.
- Check for
 - broad-based gait and small steps
 - reduced arm swing
 - stooped posture
 - reduced flexion of hip and knees
 - uncertainty or stiffness with turning.

Romberg test

- The Romberg test is a test of proprioception.
- A positive test is caused by proprioceptive dysfunction or vestibular dysfunction.⁶
- It is positive when the patient can stand with their feet together and eyes open without losing their balance, but is unable to remain steady with their eyes closed.
- This happens because the patient is using vision to compensate for the lack of sensory feedback they are receiving from their lower extremities.
- A functional correlate of this might be when a person cannot close their eyes while showering.
- Most patients with cerebellar lesions cannot maintain posture with visual cues.⁶

Timed up and go

- The patient begins seated.
- The patient is instructed to stand from the chair and walk three metres, turn around, return to chair and sit down.
- Normally, a patient can manage this within 10 seconds.
- The timing is not as important as the observation of sitting-to-stand, gait, turning and how the person manages the task.

Single-leg stance

- Observe the patient standing on one leg on a firm surface with their eyes open for 10 seconds, and repeat this assessment two more times.
 - Score 1: Complete three trials successfully.
 - Score 2: Complete one or two trials successfully.
 - Score 3: Unable to complete any trials.
 - A score of 2 or 3 indicates significant sensory and strength impairment.

Sternal push

- This test evaluates the ability of the patient to respond to an external stress.
- The patient stands with their feet comfortably together and the examiner delivers a push to the sternum.
- Normally, a patient can recover from this by invoking postural support muscles.
- A patient who needs to take a few steps backward to adjust is at risk of falls.
- A patient who appears to make no adjustment and fall backwards is at high risk.
- This test should be carefully administered with staff placed to catch the patient.

Shoulder tug

- The patient stands with feet comfortably close together and eyes open.
- The examiner stands behind the patient, provides a warning, and delivers a brief tug backward to both shoulders.
- If the patient falls, they will fall into the arms of the examiner.
- Failing this test means the patient is at risk of falls.

Tandem gait or heel–toe walking

- The patient is asked to walk in a straight line placing one foot immediately in front of the other, heel to toe
- This requires the patient to walk with a narrow support base.
- This test can uncover cerebellar, brain stem and cerebellar tract disorders.

Functional reach

- The ability of the patient to reach in any direction outside of their base of support is important for independent domestic living.
- A standardised version of this test is available; however, simple observation of the patient's ability to reach objects can be very informative.

Referral to physiotherapy

It may be prudent to refer the patient to a physiotherapist for a more detailed assessment of gait, which can identify the source of many gait problems.

Pathology

Depending on the various examination findings, the following investigations may be relevant:

- Full blood count
- Urea, creatinine, electrolytes
- Magnesium, calcium
- Hemoglobin A1c (HbA1c)
- Thyroid function tests
- Liver function tests
- Vitamin B12, folate
- Electrocardiography
- Echocardiogram
- Vitamin D
- Tilt testing
- Imaging

Diagnostic considerations

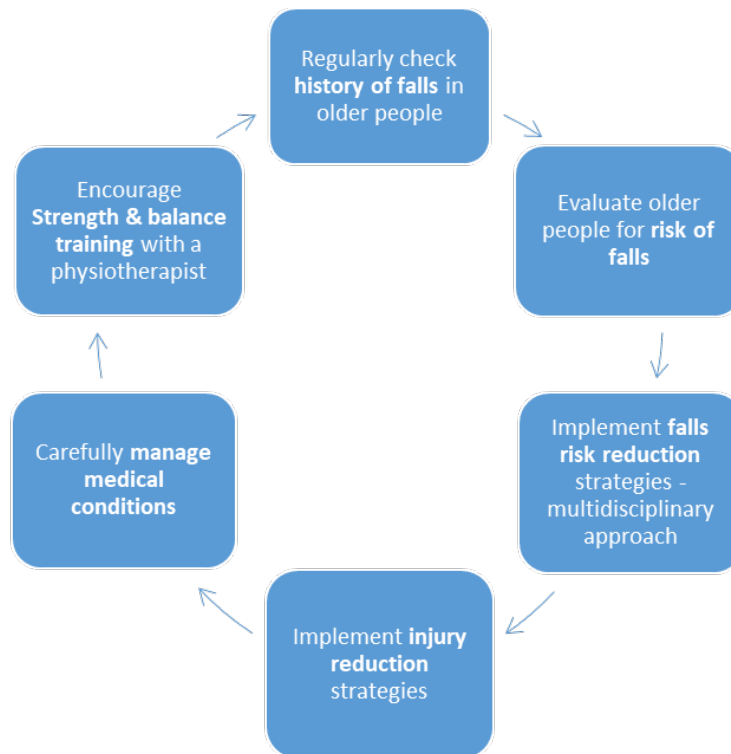
There are several important specific conditions to consider with falls:^{3,7,8,9,10,11}

- Neurological conditions
 - Cervical myelopathy
 - Peripheral neuropathy
 - Lumbar stenosis
 - Cerebellar ataxia
 - Parkinson's disease and related syndromes
 - Dementia
- Cardiovascular
 - Vasovagal syndrome
 - Orthostatic hypotension
 - Carotid sinus hypersensitivity
 - Cardiac rhythm disturbances
- Vestibular
 - Vestibular disease
 - Cervical vertigo: osteoarthritis of the neck

Management

The overall management of older people who regularly fall, or who are at risk of falls is illustrated in Figure 1.

Figure 1. General management approach to falls in older people



Non-pharmacological

Prevention of falls

- Postural hypotension – encourage adequate hydration, liberalise salt in diet where possible, review medications (see below), consider graduated light pressure stockings (if tolerated), suggest small frequent meals rather than large meals, advise mindful, slow postural adjustments after rising in the morning, after meals and after defecation.^{12,13,14,15}
- Address undernutrition.
- Manage incontinence.
- Manage visual impairment – optometrist/ophthalmologist input, expedite necessary cataract surgery.¹⁶
- Manage hearing impairment – refer for audiology assessment.
- Develop individualised exercise program to improve muscle strength, balance, endurance and flexibility – referral to a physiotherapist for individual or group classes may assist with improving muscle strength, balance, endurance and flexibility.¹⁶
- Suggest commencement of Tai Chi – evidence supports role in fall prevention.¹⁶
- Refer to physiotherapist for mobility assisting devices.
- Refer to podiatrist for foot care and appropriate footwear.¹⁷
- Refer to occupational therapist for home assessment⁵ and environmental modifications (eg flooring, furniture, lighting, handrails).

Reduction of injury in the event of a fall

- There is marginal evidence that wearing hip protector pads prevents injury in frail older people in RACFs (who are compliant wearers).
- Environmental modifications can be made (eg carpet increases the risk of falls).

Pharmacological

Prevention of falls

- Deprescribe where possible, including a pharmacist review of medications where appropriate (refer to Part A. Deprescribing).
- Reduce or cease psychotropic medications.
- Review medications with dehydrating effect/contributing to postural hypotension (eg diuretics, laxatives).
- Ensure the patient is replete of vitamin D by checking the baseline and supplement if required – vitamin D in individuals with low levels may make no difference to the risk of falling but reduces rate of falling.¹⁸
- Ensure the patient is replete of vitamin B12.
- Manage other medical conditions (as required).

Reduction of injury in the event of a fall

- Manage osteoporosis to improve bone integrity.
- Encourage vitamin D and calcium supplements (as required).

Post-fall assessment

After an older person has experienced a fall, it is important to conduct a post-fall assessment to identify any injuries, understand what may have caused the fall and, importantly, prevent or reduce the risk of further falls. This should include the following steps:¹⁶

- Obtain a history of the fall, mechanism, medications, acute/chronic medical conditions, and mobility levels.
- Identify sites of injury, consider the need for head injury observations.
- Has the fall resulted in a significant period of immobility? If so, close monitoring/investigation is required.
- Examine the patient, considering vision, gait and balance, and lower extremity joint function.
- Undertake a basic neurological examination: mental status, muscle strength, lower extremity peripheral nerves, proprioception, reflexes, test of cortical, extrapyramidal and cerebellar function, and cranial nerves.
- Check basic cardiovascular status: heart rate and rhythm, postural pulse and blood pressure; if appropriate, heart rate and blood pressure responses to carotid sinus stimulation.

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