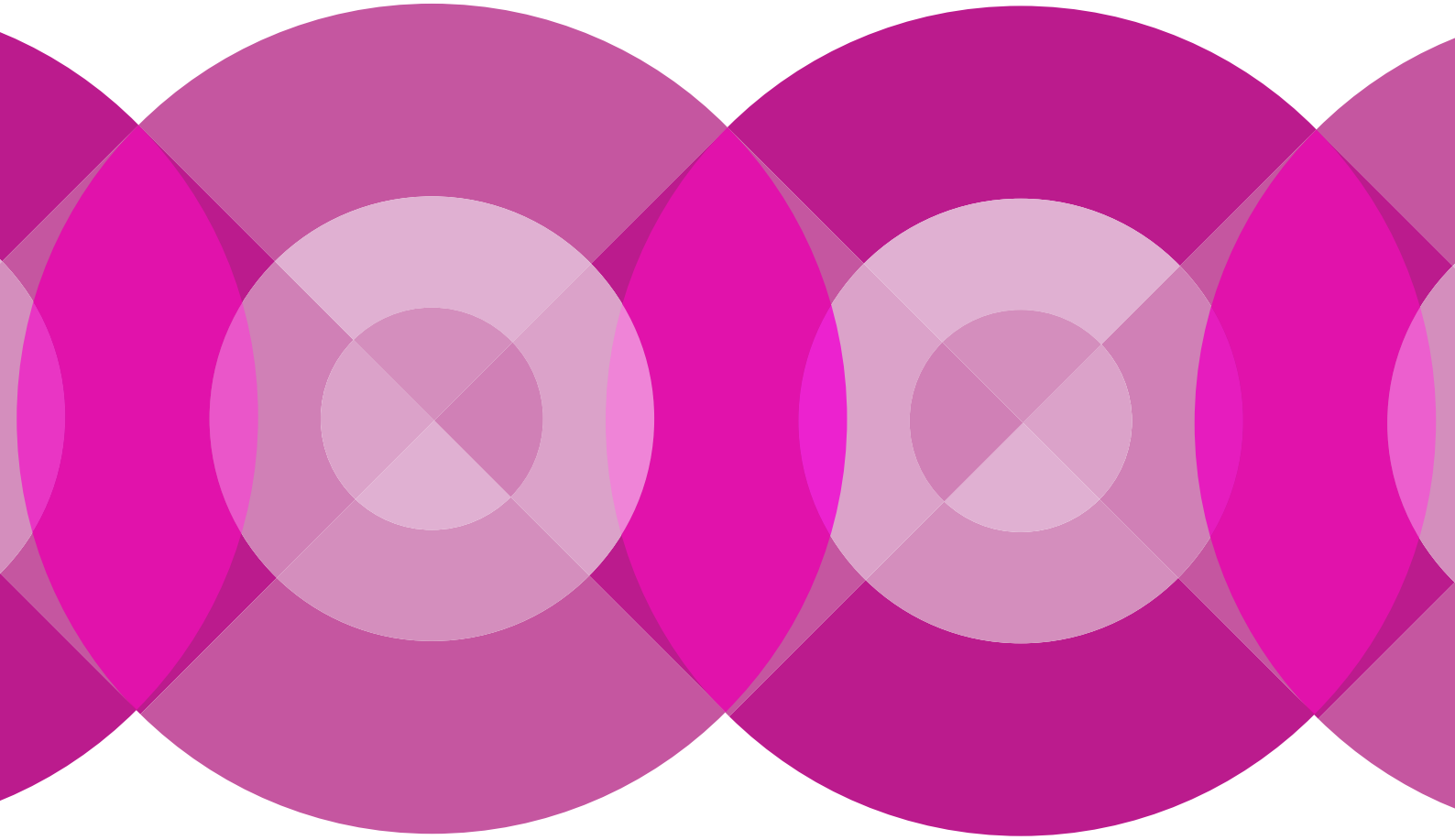
AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE



Preventing Falls and Harm from Falls in Older People

Best Practice Guidelines for Australian Hospitals

Reference Document

Published by the Australian Commission on Safety and Quality in Health Care

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ISBN: 978-1-923353-15-2

The Commission's preference is that you attribute this publication (and any material sourced from it) using the following citation:

Australian Commission on Safety and Quality in Health Care. Reference Document for the Falls Guidelines for Australian Hospitals Reference Document. Sydney; ACSQHC, 2025.

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Executive summary

Minimising falls and harm from falls remains a key challenge for the quality of care of older people in hospitals. Fortunately, many falls can be prevented with the systematic implementation of tailored multifactorial falls and harm from falls prevention interventions.

Purpose and background

The *Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines for Australian Hospitals* (the Falls Guidelines) provides best practice advice and supporting resources on preventing falls and harm from falls in older people for health professionals providing care to older people in Australian hospitals.

The Falls Guidelines are made up of a suite of documents:

- *Reference Document* (this document): presents the international evidence on best practice that informs the Falls Guidelines recommendations and good practice points.
- *Falls Guidelines:* a summary guide including the recommendations and good practice points designed for routine use in the hospital by all health professionals.
- *Fact sheets:* an overview of the Falls Guidelines and the recommendations.

The Australian Commission has developed the Falls Guidelines on Safety and Quality in Health Care, offering a nationally consistent approach to preventing falls based on best practice recommendations.

The guidelines build on the previous Falls Guidelines published in 2005 and 2009 and include a review of international best practice policies and procedures by experts from across Australia. Where evidence to support best practice falls management for older people in hospital does not exist, equivalent evidence for older people living in the community or residential aged care services has been used.

The Falls Guidelines seek to guide all aspects of care of older people in hospitals relevant to falls and fall injury prevention.

This includes fall risk assessment, balance and mobility, cognitive impairment, medicines, continence, feet and footwear, syncope, dizziness and vertigo, vision, hearing, environment, monitoring and observation, restrictive practices, hip protectors, Vitamin D and calcium, osteoporosis, and post-fall management.

Separate Falls Guidelines have also been developed for residential aged care services and community care settings.

Recommendations and Good Practice Points

The recommendations and good practice points listed in Chapter 2 are designed to guide health professionals in providing the best possible care to older people in Australian hospitals and prevent falls and harm from falls.

Recommendations are based on evidence from intervention trials in hospital settings with outcomes related to falls or fall injuries. The associated level of evidence (see Appendix) is aligned with the modified GRADE approach used by the 2022 World Falls Guidelines1 :

- 1 indicates a strong recommendation
- 2 indicates a weak or conditional recommendation
- A, B and C indicate high, intermediate and low-quality evidence, respectively.

Good practice points should also be considered as they guide all aspects of care of older people relevant to falls and fall injury prevention and are based on research and expert opinion on best practice.

The best possible care is enabled by effective communication with and between healthcare professionals, the multidisciplinary team, and the older person and their carers and family (to the extent the older person chooses).

Key messages of the Falls Guidelines

Fall prevention is everyone's responsibility

A fall is defined as:

> **'An event which results in a person coming to rest inadvertently on the ground or floor or other lower level.' World Health Organization.**[2]

Many falls can be prevented. Health professionals and other hospital staff play a key role in preventing falls in hospitals. Organisation-wide fall and fall injury prevention programs require a multidisciplinary perspective. They are most effective when health professionals and other hospital staff are included in the development of the program.

All older people in hospital are at risk of falling

Falls are a common reason for older people presenting to a hospital. Falls can occur after admission to hospital or following discharge. Falls can occur in people of all ages and may result in injury, but they can also result in minimal or no harm. The risk, frequency and severity of fall-related injury increases with age.

In hospital, all older people should be considered at risk of falling and be individually assessed to identify necessary fall injury prevention interventions.

Fall prevention is effective when tailored

Effective fall prevention involves tailored interventions based on the older person's individual risk factors. Using any one intervention on its own is unlikely to reduce the risk of falling. Managing many of the risk factors for falls has wider health benefits for the older person beyond fall prevention.

Older people have the right to make decisions that affect their lives. Respecting these decisions is an important part of this right, even if there is some risk to themselves – this is called dignity of risk. To support dignity of risk, partner with the older person to:

- identify their goals of care
- share the decision making on fall prevention interventions
- maintain their independence and quality of life
- involve carers and family to the extent the older person chooses.

Provide education to older people, their carers and family about the older person's fall risk and any tailored fall prevention interventions.

Safe staffing levels, skill mix and education support good clinical care

Safe staffing levels and a trained and skilled workforce support good clinical care in the prevention of falls and harm from falls.

Multidisciplinary collaboration by a range of skilled health professionals may be required to engage with the older person to support their dignity of risk in fall prevention and optimise their quality of life.

Fall prevention interventions should be monitored and reviewed regularly for safety and effectiveness. Changes to an older person's fall risk should be communicated with the multidisciplinary team.

Key messages of the Falls Guidelines

Review and report every fall

Whether there is injury, minimal harm or no harm from a fall, all falls:

- must be taken seriously
- require an immediate response
- must be reviewed and reported in line with hospital requirements.

Falls may be the first indication of an underlying condition in an older person that may require assessment.

Determine how and why a fall may have occurred and reassess the older person to identify new fall risk factors. Implement tailored interventions to address risk factors and reduce the risk of another fall.

Results will come

The results of a fall prevention program may not be immediately clear. There may be a time lag between investment in a fall prevention program and measurable improvements in outcome measures related to falls and harm from falls. Outcome measurements may also include the tailored approach used with the older person in fall prevention.

Alignment with other hospital prevention programs (e.g., delirium) may be useful for informing broader quality improvements.

1 Purpose and use of the guidelines

Falls are a significant cause of harm to older people, with falls in hospitals an increasingly common and costly problem and a priority improvement area for health services internationally. Many falls can be prevented. Fall and injury prevention is everyone's responsibility.

Falls reduction is a focus of the National Safety and Quality Health Service (NSQHS) Standards. [3] The NSQHS Standards apply to all public and private health service organisations providing acute care, subacute care and day procedures in Australia.

1.1 About the guidelines

The *Preventing Falls and Harm from Falls in Older People - Best Practice Guidelines for Australian Hospitals* aim to improve the safety and quality of care for older people, offering a nationally consistent approach to preventing falls in hospitals.

The Falls Guidelines are made up of a suite of documents:

- *Reference Document* (this document): presents the international evidence on best practice that informs the Falls Guidelines recommendations and good practice points.
- *Falls Guidelines:* a summary guide including the recommendations and good practice points designed for routine use in the hospital by all health professionals.
- *Fact sheets:* an overview of the Falls Guidelines and the recommendations.

In developing the Falls Guidelines, the Australian Commission on Safety and Quality in Health Care has built upon the previous guidelines, published in 2005 and 2009, and reviewed international best practice, policy and procedures. [4, 5]

Separate Falls Guidelines have been developed for community and residential aged care settings.

1.2 Scope of the guidelines

1.2.1 Targeting older Australians

Falls can occur at all ages, but the frequency and severity of fall-related injury increases with age. [6] The Falls Guidelines focus on older people aged 65 and over. A broader age group is used for older Aboriginal and Torres Strait Islander people aged 50 and over. [7]

People outside these age groups who are at risk of falling may share the risk factors identified in the Falls Guidelines, such as those with a history of falls, mobility or cognitive disability, or other conditions that alter functional ability. Care should be taken to ensure any fall prevention interventions and strategies are appropriate for the person receiving them.

As part of a life course approach to maximising functional ability with increased age, as recommended by the World Health Organization, [8] community-based fall prevention initiatives, such as exercise and management of individual risk factors, should be encouraged throughout life.

1.2.2 Specific to Australian hospitals

The Falls Guidelines have been developed for health professionals and hospital staff involved in providing care to older people in Australian hospitals, including emergency departments, acute and subacute settings, and specialised units. This includes support services as well as clinical, management and corporate staff.

The Falls Guidelines recommend that hospitals apply a targeted approach to preventing falls in older people by considering all older people at high risk of falling and individually assessing each older person to determine which fall injury interventions are necessary. Hospitals should apply a person-centred approach to all patients, including those under 65 years of age.

1.2.3 Context of care

The guidelines advocate autonomy, independence, enablement and rehabilitation in the context of an acceptable risk of falling. A degree of risk is inevitable in promoting autonomy in older people.

Any fall needs to be considered in the context of the care provided relative to best practice for the older person within the specific environment. Some falls may still occur even when best practice is followed. In such cases, there remains a need for vigilant monitoring, review of the care plan and implementation of actions to minimise injury risk.

It is critical that all people are supported to exercise choice and that their care is tailored to their different needs and preferences. Good clinical care can optimise a person's quality of life, reablement and maintenance of function. Carers, family and substitute decision makers may play an important role in a person's life, and these relationships should be recognised and respected.

Incident management of falls

A hospital's incident management system should be used to support patients, carers, families and the workforce to identify, report, manage and learn from all falls. The accuracy, quality and completeness of the data and reporting support appropriate incident review. An appropriate risk or severity rating should be applied to each incident. [9]

1.3 Terminology

1.3.1 Suitably qualified health professional

The Falls Guidelines are designed to guide health professionals providing care in Australian hospital settings. To accommodate for the diversity in size, location, case mix and skills of the workforce in Australian hospitals, the guidelines use the phrase 'suitably qualified health professional' to recognise that health professionals have different scopes of clinical practice and roles. The guidelines recommend that the most appropriately and suitably qualified health professional undertake the clinical role.

1.3.2 Definition of a fall

To ensure a nationally consistent approach to fall prevention within Australia, the Falls Guidelines use the World Health Organization's definition of a fall:

> A fall is an event which results in a person coming to rest inadvertently on the ground or floor or other lower level. [8]

A fall resulting in major injury is a fall that meets the definition of a fall and results in one or more of the following:

- bone fractures
- joint dislocations
- closed head injuries with altered consciousness
- subdural haematoma. [10]

1.3.3 Definition of assessment and risk assessment

In the Falls Guidelines, *assessment* is defined as an objective evaluation of the older person's functional level based on their ability to perform specific tasks and activities of daily living. This includes dressing, feeding, grooming and mobilising.

Fall risk assessment is a detailed and systematic process used to identify the fall risk factors of an older person. It is used to help identify which fall prevention interventions to implement.

Chapter 6 provides a list of validated fall risk assessment tools for use in hospitals.

1.3.4 Definition of interventions

An *intervention* is a therapeutic procedure or treatment strategy designed to cure, alleviate or improve a certain condition. Interventions can take the form of medicines, surgery, early detection (screening), dietary supplements, education and minimisation of risk factors.

In fall prevention, interventions can be:

- **single interventions:** targeted at a single fall risk factor
- **multiple interventions:** where everyone receives the same, fixed combination of fall prevention interventions
- **multifactorial interventions:** where people receive multiple interventions to prevent falls and harm from falls, with the combination of interventions tailored to the person based on an individual assessment. [11]

Multifactorial fall and fall harm prevention programs, utilising a range of interventions as detailed in these guidelines, have been shown to be successful in reducing falls in older people in hospital and following discharge.

1.4 Development of the guidelines

Experts from the Australian and New Zealand Falls Prevention Society oversaw the development of the Fall Guidelines, which involved:

- a search of the most recent literature for each fall risk factor or intervention
- inclusion of definitive fall risk factor and intervention studies irrespective of their date of publication
- a systematic review (Appendix 3) using methods from the Cochrane review of fall prevention interventions in care facilities [12]
- reference to the 2022 World Falls Guidelines for Prevention and Management of Falls in Older Adults [13]
- feedback from health professionals and policy staff implementing the 2009 guidelines
- clinical advice from the expert advisory group
- guidance from external expert reviewers
- guidance from international expert reviewers.

A systematic review of each aspect of fall prevention was beyond the capacity and timeframe of the update of the Falls Guidelines. The review of assessment and intervention recommendations was conducted with experts using the highest quality information for each intervention in line with recommended methods for evidence-based practice.

The Falls Guidelines were finalised with feedback from falls and fractures, aged care and policy experts, as detailed in Appendix 1. Contributors to the 2009 guidelines are listed in Appendix 2. Further discussion of methodology, the update of the 2018 Cochrane review for preventing falls in older people [11] and additional research is provided in Appendix 3.

1.4.1 Levels of evidence

Table 1.1 outlines the modified GRADE system used in the guidelines to evaluate the strength of evidence of fall prevention interventions. This system is based on the 2022 World Falls Guidelines for Prevention and Management of Falls in Older Adults. [13]

1 Purpose and use of the guidelines

Table 1.1: The modified GRADE system used in the Falls Guidelines for evaluating the strength of evidence of fall prevention interventions

Recommendations	**Strength of Recommendation**	**1**	**Strong:** benefits clearly outweigh undesirable effects.
		2	**Weak or conditional:** either lower quality evidence or desirable and undesirable effects are more closely balanced.
	Quality of evidence	**A**	**High:** further research is unlikely to change confidence in the estimate of effect.
		B	**Intermediate:** further research is likely to have an important impact on the confidence in the estimate of effect and may change the estimate.
		C	**Low:** further research is very likely to have an important impact on the confidence in the estimate of effect and is likely to change the estimate.
Good practice points	In cases where no quality studies are available for interventions likely to have benefits based on expert opinion, good practice points were formulated.		

1.5 How to use the guidelines

The Falls Guidelines are designed to provide a nationally consistent approach to inform falls and harm from falls prevention programs in hospitals across Australia.

Information on how the guidelines relate to fall and fall injury prevention programs is provided in Table 1.2.

1 Purpose and use of the guidelines

Table 1.2: How to use the Falls Guidelines

	Steps involved	Chapter/s in Guidelines
1	Plan and implement a fall and fall injury prevention program, which includes the ongoing evaluation of the effectiveness of that program.	Chapter 2: a summary of recommendations and good practice points Chapters 3-5: an overview of evidence
2	A falls program should start with an individualised assessment of the older person to determine if they are at risk of falling and at risk of harm from falling.	Chapter 6: discussion of screening and assessment
3	If the older person is at risk, targeted individualised interventions can be applied at the point of care. That is the site where the older person receives the intervention.	Chapters 7-17: individual risk factors for falls and related interventions. The order of interventions does not imply the importance of one intervention over another.
4	Additional interventions to minimise harm from falls should be considered.	Chapters 18-21: interventions to minimise harm from falls The order of interventions does not imply the importance of one intervention over another.
5	Providing post-fall response and assessment immediately after a fall is critical to delivering safe clinical care.	Chapter 22: post-fall management.

Health professionals and carers should consider the advantages and risks of using injury prevention strategies in hospital to minimise falls and harm from falls and support older people in exercising dignity of risk. These strategies can be used after a fall or applied systematically to the population at risk.

1 Purpose and use of the guidelines

Chapter layout

Chapters focused on fall risks and interventions begin with a set of evidence-based recommendations.

- **Recommendations** - are based on the best available evidence and were developed by expert clinicians, researchers and stakeholders. A level of evidence aligned to the modified GRADE approach is provided with each recommendation.

The supporting information for the recommendations and good practice points is presented in the remainder of the chapter, which is organised into:

- **background information and evidence** – contains an overview of the risk factor or intervention, and a summary of the relevant literature
- **principles of care** – explains how to implement the intervention of interest
- **special considerations** – provides information relevant to older people with cognitive impairment.

Text boxes with important information

Points of interest and case studies are included throughout the guidelines to provide important additional information and illustrative examples.

Boxes containing useful websites, organisations or resources are also provided. References are listed at the end of each chapter.

2 Summary of recommendations and good practice points

This chapter contains a summary of the recommendations and good practice points from *Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines for Australian Hospitals*.

Recommendations

Fall Risk Assessment for Tailoring Interventions

Recommendations

Education: Provide tailored education about fall prevention to older people who wish to participate, and to all staff and families. (Level 1B)

Tailor interventions: Provide tailored multifactorial fall prevention interventions for all older people based on an assessment of individual risk factors. (Level 2B) Calculating a fall risk score is not necessary. (Level 2B)

Good practice points

- Consider all older people in hospital to be at high risk of falls. Identify risk factors for people admitted to hospital, attending the emergency department or outpatient services, especially for people with a history of falls or comorbidities that may influence their fall risk.
- Consider all people with mobility or cognitive disabilities to be at high risk, regardless of age.
- Implement tailored interventions informed by a multifactorial comprehensive assessment and goals of care to systematically address fall risk factors during hospital admission, inpatient stays, discharge planning and referral to community services. **Ensure delirium prevention, assessment and management are part of falls prevention programs.**
- Ensure all health professionals involved in the care of older people receive ongoing education about fall risk and fall prevention.
- Facilitate regular and effective communication among members of multidisciplinary teams caring for older people and include the person's carers and family.
- Ensure people are provided with nutritious diets, in line with their preferences, that contain sufficient protein to maintain muscle mass, include potassium, calcium, vitamin D, dietary fibre and vitamin B12, and contain little to no added sugar, saturated fats and sodium.
- Provide meal assistance and fluids when requested or needed to support nutritional intake and hydration.

Balance and Mobility

Good practice points

- Assess the person's balance, mobility and strength using validated tools to:
  - ☐ quantify the extent of the person's balance, mobility and muscle strength
  - ☐ guide the prescription of exercise, mobility aids and equipment
  - ☐ measure improvements in the person's balance, mobility and strength.
- Provide the level of hands-on assistance required to meet the person's mobility needs.
- Balance the risks and benefits of restricting the person's activity with maintaining their mobility to restore function and support safe mobilisation.
- Refer people with ongoing balance and mobility issues to a post-hospital fall prevention exercise program in the community.

Cognitive Impairment

Good practice points

- Identify and assess fall risk factors for people with cognitive impairment early in the hospital admission.
- Regularly reassess the cognitive status of the person, including when there is a change in their condition, including after a fall or surgery.
- Use a validated tool to assess older people for delirium, particularly for those who present with an acute change in cognitive function. Consider sepsis as a cause for delirium – see the Sepsis Clinical Care Standard.
- Where delirium has been identified, use a delirium pathway to determine the cause, implement delirium prevention interventions and manage the delirium by following the evidence-based interventions in the Australian Clinical Practice Guidelines for the Management of Delirium in Older People and the Delirium Clinical Care Standard.
- Assess people with gradual-onset, progressive cognitive impairment to determine diagnosis and, where possible, identify and address reversible causes. Use the Australian Clinical Practice Guidelines and Principles of Care for People with Dementia.
- Involve people with cognitive impairment and substitute decision-makers in supported decision-making about which fall prevention interventions to use and how to use them. Carers and family who know the person may suggest ways to support them.
- Implement models of care that enable adequate supervision, equipment and support for the person with cognitive impairment. Respond to fluctuations in the person's mobility, cognitive state and the impact of changed behaviours on others.
- For people with cognitive impairment, use reasonable adjustments to implement the *Falls Guidelines for Hospitals*. Reasonable adjustments should include (but are not limited to):
  - ☐ employing dementia-enabling techniques to manage the physical environment that facilitates people living with dementia to feel supported and engaged
  - ☐ Using tailored communication approaches to encourage the person's participation in decision making and care planning.
- Involving the person's carers and family in the assessment and design of fall prevention interventions.

Medicines

Good practice points

- Take the best medicines history possible and review all of the person's medicines while in hospital.
- Adjust, taper or cease medicines that increase the person's fall risk, where possible.
- Ensure medicines are commenced with an age-appropriate dose and doses are adjusted slowly based on regular monitoring for efficacy and emergence of adverse effects.
- Advise people taking medicines that increase their risk of falls about ways to reduce this risk.
- Complete a medication review to improve the likelihood of identifying medicines that increase the risk of falls (sometimes referred to as fall-risk-increasing drugs). Tapering or cessing of these medicines where possible may significantly reduce fall risk.
- Implement alternative strategies for behaviour support planning, promoting sleep, and addressing anxiety, depression and pain when indicated. Psychotropic medicines should only be considered for managing changed behaviours when there has been an adequate trial of non-medication strategies, and they have been ineffective. Document the purpose and the plan for review. See Psychotropic Medicines in Cognitive Disability or Impairment Clinical Care Standard and Clinical Practice Guidelines and Principles of Care for People with Dementia.
- Communicate any recent or proposed changes to a person's medicine regimen to the multidisciplinary team at transitions of care.

Continence

Good practice points

- Complete a continence assessment with the older person to identify and treat factors that can cause or contribute to incontinence. Implement interventions to minimise fall risk related to incontinence and facilitate access by the older person to a specialist continence service when required.
- Proactively manage the older person's toileting needs, including nocturia (urge to urinate at night), urgency and frequency as part of a multifactorial approach to care. This may include providing regular proactive toileting assistance, using continence aids or facilitating supervision in bathrooms.
- Manage urinary tract infections and reduce inappropriate use of antimicrobials.

Feet and Footwear

Good practice points

- Assess if the person has any foot pain or problems and if their footwear is safe and well-fitted.
- Refer people with foot conditions and foot pain to a podiatrist for assessment and treatment in hospital or after discharge.
- Encourage people to use safe, well-fitting footwear (in hospital and after discharge) that includes:
  - ☐ heels that are low and square to improve stability
  - ☐ a supporting ankle collar to improve stability
  - ☐ soles with tread to prevent slips
  - ☐ firm soles to optimise foot position sense
  - ☐ easy fastening and only including laces if the person can tie them
- Encourage the older person to use safe, well-fitting footwear rather than non-slip socks, as these are more effective in preventing falls.

Syncope

Good practice points

- Ensure older people who experience unexplained falls or episodes of collapse, including presyncopal or syncopal episodes (including postural hypotension), are urgently assessed by a medical practitioner to establish the underlying cause.
- Facilitate a medication review of the older person to identify medicines that may cause postural hypotension.
- Assess all appropriate treatment options for people diagnosed with the cardio-inhibitory form of carotid sinus hypersensitivity, including the fitting of a dual-chamber cardiac pacemaker.

Dizziness and Vertigo

Good practice points

- Assess older people complaining of dizziness and vertigo for vestibular dysfunction (balance problems), gait problems, postural hypotension and anxiety.
- Assess the older person for postural hypotension with tests of lying and standing blood pressure.
- Facilitate a review of the older person's medicine regimen to identify medicines that may cause or contribute to dizziness or postural hypotension, including but not limited to antihypertensives, antidepressants, anticholinergics and hypoglycaemics.
- Facilitate access to an appropriately trained medical practitioner or vestibular physiotherapist to assess dizziness and vestibular-related balance problems. Implement interventions for benign paroxysmal positional vertigo and vestibular rehabilitation when indicated.

Vision

Good practice points

- Include a vision test as part of an older person's fall risk assessment.
- Ensure that older people who wear glasses have access to clean glasses and wear them during their hospital stay. If the older person has different glasses for reading and distance, ensure they wear distance glasses when mobilising.
- Assess environmental factors such as adequate lighting, contrasting fixtures, painted white strips along the edges of stairs and pathways, and clear signage to help maximise visual cues and wayfinding.
- Provide increased supervision for older people with impaired vision when they are moving away from their immediate bed surrounds, as required.
- As part of good discharge planning:
  - ☐ refer older people with undiagnosed visual problems to an optometrist, orthoptist or ophthalmologist
  - ☐ facilitate timely access to cataract surgery for both eyes for older people with clinically significant visual impairment primarily due to cataracts (unless contraindicated). See the Cataract Clinical Care Standard
  - ☐ arrange for an occupational therapist to conduct a home environmental assessment and modification for those older people with severe visual impairment.

Hearing

Good practice points

- Identify any hearing problems that an older person may have as part of the fall risk assessment.
- Ensure older people who use hearing aids have them within easy reach, that the older person wears the hearing aids when mobilising and that the hearing aids are working.
- Use a pocket talker (a device that amplifies sound closest to the listener while reducing background noise) to communicate with an older person with a hearing impairment, as required and in line with the older person's preferences.
- Provide increased supervision for older people with impaired hearing when they are moving away from their immediate bed surrounds.
- As part of good discharge planning, refer older people with undiagnosed hearing problems to an audiologist.

Environment

Recommendation

Home safety after discharge: As part of discharge planning, arrange home safety interventions delivered by an occupational therapist for older people at an increased risk of falls after they return home. (Level 1A)

Good practice points

- Provide orientation to the hospital environment, including the layout of the ward, location and operation of nurse call bells, and the safe operation of the hospital bed functions. Minimise transfers and changes in the physical environment during admission where possible.
- Ensure regular contact between the multidisciplinary team and the person (intentional rounding) to evaluate and modify the person's environment and provide, review and assess the person for any care needs.
- Conduct comprehensive environmental reviews regularly and modify the hospital environment as necessary to reduce the risk of falls. This includes furniture, lighting, floor surfaces, signage to maximise visual cues and wayfinding, clutter and spills, and mobility aids. Best practice is to combine environmental reviews with work health and safety audits.
- Ensure procedures are in place to document environmental causes of falls and educate staff about environmental risk factors for falls in hospitals.
- Ensure personal belongings and equipment are easily and safely accessible.
- Arrange for people at a higher risk of falls to be assessed by an occupational therapist or physiotherapist for specific environmental or equipment needs and training to maximise safety.

Monitoring and Observation

Good practice points

- Discuss the risk of falling and the need for close observation with the person, carers and family and develop a collaborative management plan to reduce identified risks.
- Create a clear monitoring plan that specifies the vital signs and other relevant physiological observations to be recorded on an observation and response chart, including the frequency of observation to match the person's needs. See the National Consensus Statement: Essential elements for recognising and responding to acute physiological deterioration.
- Provide frequent monitoring and observation of people living with dementia or delirium and those who have been administered a general anaesthetic or sedation. Fall risk alert cards and symbols to flag people at risk of a fall in the clinical record should be used where appropriate.
- Provide carers and family members with information about managing fall risk to use in their discussions about falls in hospitals.
- Encourage carers and family to notify staff if the person requires assistance.
- Identify appropriate resources (including workforce and support systems) for people at a higher risk of falling. Ensure policies are in place and roles are clearly defined.

Restrictive Practices

Good practice points

- When a person exhibits changed behaviours (i.e. agitation or aggression), assess and respond to any immediate risks to the person or others, including an increased risk of falls.
- Conduct a comprehensive assessment of the person to identify possible causes of changed behaviours. Treat and manage any causes of these behaviours, such as delirium or other unmet needs, including pain, thirst, hunger, or feeling hot or cold. Use the Clinical Practice Guidelines for the Management of Delirium in Older People. Non-medication strategies should always be used as the primary strategies for managing changed behaviours. See the Clinical Practice Guidelines and Principles of Care for People with Dementia, the Delirium Clinical Care Standard and the Clinical Care Standard on Psychotropic Medicines in Cognitive Disability or Impairment.
- Use a person-centred behaviour support plan for a person with cognitive impairment, including delirium. If a behaviour support plan is not available, discuss all appropriate behaviour support strategies with the person and their carers, family and substitute decision maker. Focus on caring for people with changed behaviours by understanding the cause of the behaviour and treating reversible causes.
- Restrictive practices must only be used as a last resort, in the least restrictive form and for the shortest possible time necessary to prevent harm to the person or others. Follow relevant national, local and state policies, procedures, and regulations.
- If alternatives to restrictive practices have been exhausted in addressing the changed behaviours, discuss options with the person or substitute decision maker, explain the benefits and risks of the restrictive practice to be used and document informed consent. Document the rationale for using restrictive practices, the anticipated duration and criteria for cessation agreed upon by the health care team.
- Continue non-medication behaviour support strategies in the event a restrictive practice is used.

Hip Protectors

Good practice points

- Prioritise older people who fall frequently, have osteoporosis or a low body mass index for consideration of using hip protectors to reduce the risk of fall-related fractures as part of a multifactorial approach.
- Provide information to people and their carers, family and substitute decision makers to support informed decision-making about the use of hip protectors. Provide training to the workforce, the older person and their carers and family in the correct use and care of hip protectors.
- When using hip protectors, check regularly that:
  - ☐ the person is wearing their hip protectors
  - ☐ the hip protectors are in the correct position
  - ☐ the hip protectors are not causing pressure on the person's skin that may contribute to pressure injuries
  - ☐ the hip protectors do not impact on the ability of the person to toilet independently
  - ☐ the person has not stopped wearing the hip protectors because of discomfort, inconvenience or another reason.
- Do not share hip protectors among people, as they are a personal garment.

Vitamin D and Calcium

Good practice points

- Monitor the nutritional needs, requirements and preferences of older people, and refer them to a dietitian if necessary.
- Facilitate vitamin D supplementation for older people who are unlikely to receive adequate sunlight for vitamin D production.
- Facilitate a review of the older person's diet if dietary calcium intake is insufficient. Calcium supplementation for older people should be restricted to a maximum dose of 500 – 600 mg of elemental calcium per day. There is concern that calcium supplementation increases the risk of cardiovascular events.

Osteoporosis

Recommendation

Hip fracture care: Following a hip fracture in an older person, provide post-operative care in a geriatric orthopaedic service with multidisciplinary comprehensive geriatric assessment, management and rehabilitation. (Level 1B)

Good practice points

- Develop strategies to strengthen and protect the person's bones, reducing the risk of bone injuries from falls when appropriate. This includes improving muscle strength, optimising function and improving the safety of the older person's environment.
- Refer people with a history of recurrent falls for bone mineral density testing to identify possible osteoporosis.
- Review the person's medicine regimen as part of reducing the risk of osteoporosis (e.g. corticosteroids, long-term anticonvulsant treatment). There may be alternative medicines that do not confer this risk.
- Establish hospital protocols to ensure pathways for intervention and management of bone health in people who have sustained a minimal trauma fracture in partnership with the person's general practitioner. Refer to the fracture liaison service where available.
- Ensure that before a person leaves hospital after a hip fracture, they receive a falls and bone mineral densitometry assessment / Dual Energy X-Ray (DXA) scan and management plan, with appropriate referral for secondary fracture prevention. Involve the person's general practitioner. See the Hip Fracture Clinical Care Standard.
- Communicate any recommendations to the multidisciplinary team involved in the person's care at transitions.

Post-fall Management

Good practice points

- Provide post-fall response and clinical care to the person immediately after a fall. Complete the relevant immediate intervention, assessment and investigations, as well as increase the frequency of monitoring vital signs and other relevant physiological observations to be recorded on an observation and response chart to match the older person's needs.
- Assess and monitor the patient for signs and symptoms of injury and use local escalation processes as determined by the clinical condition of the person who has fallen.
- Identify, investigate and report the cause and the consequences of every fall. See Hip Fracture Clinical Care Standard where appropriate.
- Complete a comprehensive assessment for every person who has fallen, including a medication review. Inform the multidisciplinary team and update the care plan to address comorbidities and fall risk factors to reduce the risk of another fall. Implement immediate actions to reduce the risk of subsequent falls. Where appropriate, include the person and their carers and family in decision-making to reduce the risk of further falls.
- Conduct an in-depth analysis of every fall event, particularly if there has been a serious injury or death. Analyse falls with a view to informing how changes to organisational practices and policies can prevent falls more broadly.
- Train and educate staff in post-fall management, reporting and documentation.
- Analyse fall data and delirium data to inform how changes to organisational practices can prevent falls. At discharge or during transitions of care, ensure that communication of any in-hospital falls or identification of fall risks with all relevant members of the person's primary healthcare team. Include this information in the discharge summary, along with details of any interventions, including medication changes. See Principles for safe and high-quality transitions of care.

3 Falls, falls injuries and risk factors

Falls in hospital are a major issue for hospitals in Australia and worldwide. Up to 60% of falls in hospitals result in injury. [14] This includes minor lacerations, contusions and sprains as well as very serious fractures, head injuries and even death. [14, 15, 16, 17, 18, 19]

Falls in hospitals often lead to further complications for the older person, including anxiety, a fear of falling or a loss of confidence in walking. Falls in hospitals are also associated with longer stays, additional diagnostic procedures, or surgery, resulting in increased costs to the healthcare system. [20 21 22] Carers are also likely to experience increased stress in supporting the older person after a fall. [20]

3.1 Characteristics of falls

The relationship between the time of fall and level of staffing suggests that most falls in hospitals occur during daylight hours when staffing levels are at their highest but when there is the greatest level of concurrent work demands. [22-25]

Reported fall data for hospitals shows: [20, 25-27]

- The bedside is the most common place for falls to occur, followed by the bathroom.
- A high percentage of falls are associated with elimination and toileting.
- Falls occur most often at times when observational capacity is low, such as at shower and mealtimes, and outside visiting hours.
- Falls occur across all age groups, with an increasing prevalence of falls in older people.
- A high percentage of falls are unwitnessed.

The pattern of falls depends on setting and case mix. More mobile older people and those in rehabilitation or mental health settings are more likely to fall when walking than to fall from a bed or a chair. [28] This should influence the focus of fall prevention interventions for these older people.

3.2 Risk factors for falls

A person's risk of falling increases with age, degree of frailty, acute or chronic medical conditions and a history of falls. General poor health or a deterioration in functional capacity for tasks and activities of daily living, including oral health, are also risk factors for falls.

A person's risk of falling increases as the number of risk factors they have increases. [29] In hospital, prolonged hospitalisation increases a person's risk.

In the hospital setting, risk factors such as confusion, unsafe gait and antidepressant medications are associated with a higher risk of multiple falls. [20, 30] An older person whose medical condition impacts directly on one or more fall risk factors, such as stroke, can also have high fall rates in the hospital setting. [20, 31] An extended hospitalisation of 19 days or more increases a person's risk of falling. [20]

Most fall risk factors can be addressed systematically to help prevent falls and associated harm. Risk factors include:

- **intrinsic risk factors** – those that relate to a person's behaviour or condition, and
- **extrinsic risk factors** – those that relate to a person's environment or their interaction with the environment.

3 Falls, falls injuries and risk factors

Falls after discharge

Older people have a higher risk of falls and falls with serious injury in the first month after hospital discharge.[32] For those older people with a higher risk of falls, interventions to reduce the risk should be included in discharge planning. Discharge planning should start early during admission to ensure all aspects of care for the older person can be addressed.

Ensure safe transitions of care by providing interventions and referral pathways to address identified fall risk factors, including at-home safety interventions to prevent further falls and associated harm.

Ensure safe transitions of care by providing interventions and referral pathways to address identified fall risk factors, including at-home safety interventions to prevent further falls and associated harm.

Best practice supports the coordination and continuity of care between the hospital, the older person and their carers and family, the older person's general practitioner and the receiving health service. By working in an integrated manner, the needs of the older person across the broader spectrum of health service delivery are more likely to be achieved.

4 Involving older people in fall prevention

It is critical that all people are supported to exercise choice and that care is tailored to their different needs and preferences.

Good clinical care can optimise a person's quality of life, reablement and maintenance of function.

Carers, family and substitute decision makers may play an important role in a person's life – these relationships should be recognised and respected.

Communication with and between the multidisciplinary team, including the person and carers and family, is critical to effectively preventing falls and responding to them. Risks, change or deterioration in a person's condition should be escalated and communicated as appropriate.

Older people in Australia may face greater challenges in accessing care due to geographical location, mobility issues, and the limited availability of services and workforce. The use of telehealth should be supported to facilitate fall prevention interventions when appropriate and available.

4.1 Best practice approach

Best practice approaches to support older people to partner in fall prevention include:

- Present the fall prevention message in the context of staying independent for longer. [33]
- Be aware that the term 'fall prevention' could be unfamiliar or difficult to understand. Support understanding through tailored communication. [34]
- Identify health literacy and communication needs and preferences, including consideration of any relevant impairments, including the older person's cognitive function.
- Provide information in a way the older person can understand. This may include providing information in the person's language, using alternative communication approaches, such as written formats (e.g. easy read, easy English and accessible formats), multimedia (e.g. images, animation and video), and offering and facilitating access to interpreters and translations.
- Identify the older person's needs, goals and preferences, and support them and their carers and family to engage in discussions about preventing falls.
- Find out what personal changes the older person can make to prevent falls and support shared and supported decision making. This may include changes to the older person's behaviour, environment, clothing and footwear.
- Explore the older person's concerns about what makes it difficult for them to take action to reduce their risk of falls (such as fear of falling, loss of confidence or concern about the stigma associated with using mobility aids) and provide support to overcome these issues.
- Develop fall prevention programs that are flexible and tailored to the older person's individual needs, goals, circumstances and interests.
- Trial a range of fall prevention interventions and review their effectiveness in partnership with the older person and their carers and family.
- Support older people in discussing their ongoing care needs and future medical treatment, including fall risk, and develop or review advance care planning documents (if and when they choose).
- Ensure that the older person in hospital and their carers, family and substitute decision-makers know how to provide feedback and raise concerns.

4 Involving older people in fall prevention

Additional information

- What is person-centred care?, resources for staff by Aged Care Quality and Safety Commission
- Supported decision-making, Older Persons Advocacy Network
- Resources, training and webinars developed by the Centre for Cultural Diversity in Ageing
- Aged Care Diversity Framework action plans, Australian Government Department of Health and Aged Care.
- Further information about person-centred care, Australian Commission on Safety and Quality in Health Care.
- Queensland Health, Stay On Your Feet in hospital and prevent falls BE SAFE brochure.

5 Fall prevention interventions

5.1 Background and evidence

Fall prevention is part of routine care in hospitals and should be addressed in the individualised plan for daily care for every patient at risk of falls.

Fall prevention interventions are therapeutic procedures or treatment strategies designed to prevent falls and the associated harm. Interventions can take the form of exercise, early detection (assessment), dietary supplements, deprescribing of medicines, environmental reviews, education and the minimisation of risk factors.

Given the complex nature of falls, fall prevention interventions have been shown to be much more effective in preventing falls and harm from falls in older people in hospital when implemented as a combination of interventions targeting the individual's fall risk factors (multifactorial interventions). [35] Using any one intervention on its own is unlikely to reduce the number of falls. [36]

Appendix 3 details the systematic review that identified the best practice evidence for preventing falls and harm from falls, which informs the Falls Guidelines.

5.2 Choosing fall prevention interventions

Most fall prevention interventions are part of routine care in Australian hospitals. The Falls Guidelines are designed to support and inform person-centred and best-practice care.

5.2.1 Fall prevention interventions for all older people

To prevent falls, a range of standard precautionary strategies should be implemented for all older people in hospital. This approach is based on good aged care practice and the assumption that all older people in hospital are at risk of falling, with their level of individual risk requiring further assessment. See Chapter 6 for information on fall risk assessment.

The success of fall prevention interventions may be affected by what interventions are already in place, the level of organisational reinforcement or support, and the duration of the intervention. When interventions are used for only a few months, this may not be long enough to change the organisational culture and embed an intervention as routine care.

5.2.2 Everyone has a role in fall prevention

All staff members, including support, clinical, administrative and managerial staff, as well as the older person and their carers (where appropriate), have a role to play in fall prevention. The importance of staff education in delivering fall prevention programs is critical to the success of the programs.

Successful in-hospital fall prevention interventions inform the recommendations and good practice points listed in Chapter 2 and should inform routine practice.

5.2.3 Individualised plan for daily care

The unique set of fall risk factors and personal preferences of each older person requires an individualised plan of action to minimise falls and harm from falls, noting that older people with multiple risk factors have a higher rate of falls than those with fewer fall risk factors.

Ask the older person about their medical history and any personal needs and preferences in developing an individualised care plan. Involve the older person's carers and family to the extent that the older person chooses.

Given the differing features of each hospital, including its wards and units, the multidisciplinary team will need to make local decisions on how to best integrate fall prevention actions into an older person's daily care plan.

5 Fall prevention interventions

5.3 Discharge planning

Interventions to reduce the risk of falls and harm from falls should be included in discharge or post-hospital care planning for older people who have been identified as having an increased risk of falls and harm from falls during their hospital admission.

5.3.1 Fall risk related to hospital stay

Older people may present to acute services with a range of fall risk factors and may leave with some or all of these or additional fall risk factors.

For example, certain medicines and balance concerns could be managed during an admission. Gait changes and dizziness may be acquired as part of the hospital admission. Risk factors such as poor vision, cognitive impairment or mobility limitations may be ongoing, while muscle weakness may be addressed through longer-term interventions.

Fall risk is increased for one month after discharge from hospital, with an estimated 15% of older people falling soon after discharge. [37]

5.3.2 Begin discharge planning early in the admission

Discharge planning should start early during admission to ensure all aspects of care for the older person are considered.

Discharge planning should involve appropriate members of the multidisciplinary team and include referral to appropriate primary health provider(s) and community services.

For example, an exercise program can be started during admission but needs to continue for some weeks after discharge to achieve optimal muscle strength. A home visit by an occupational therapist can be arranged before discharge from hospital. This intervention has been found to prevent falls in older people recently discharged from hospital and who had a fall in the previous year. [38, 39]

Communicating to the older person about discharge planning

Communication with the older person and their carers (to the extent the older person chooses) will help to ensure that the benefits and rationale of discharge planning are understood and that plans are followed. This includes communicating with the older person being discharged or transferring between facilities about their medicines, including times and doses, side effects, and interactions with food, other medicines and supplements. Ensure that unnecessary medicines are not prescribed and that accurate information about medicines is shared with all relevant medical practitioners.

5.3.3 Discharge planning from the emergency department

Identifying fall and harm from fall risk factors is crucial while the older person is in the emergency department. The emergency department provides an ideal opportunity for developing individualised care plans for the older person to minimise fall risk factors through the discharge planning processes.

Older people and fall risks associated with the emergency department

Approximately 40% of older people presenting to an emergency department after a fall are not admitted to hospital, with those older people not admitted to hospital having an increased risk of subsequent hospitalisation and even death. [40, 41]

About 6% of those older people not admitted to hospital return to the emergency department within 24 hours following another fall. [42]

Older people presenting to the emergency department with other issues may also be unsteady and at risk of future falls and harm from falls, particularly if they have a history of previous falls. [43]

5 Fall prevention interventions

Multifactorial interventions from the emergency department

There is evidence that multifactorial interventions planned at discharge from the emergency department are effective in preventing falls once the older person is back at home.

The Australian RESPOND trial involved older people presenting to the emergency department with a fall and planned for discharge home within 72 hours.[44] The intervention – which included a home fall risk assessment along with six months of telephone-based education (coaching, goal setting, and support for evidence-based risk factor management) and linkages to existing services – reduced falls by 35% compared to usual care.

Recommendations for emergency department care

Australian and New Zealand Society for Geriatric Medicine

Position Statement 14 – *The Management of Older People in the Emergency Department* – of the Australian and New Zealand Society for Geriatric Medicine [45] encourages the completion of a validated screening tool to reduce the re-presentation of older people to the emergency department or poor outcomes after discharge.

The position statement recommends the emergency department as an appropriate place to screen the older person and initiate referrals for ongoing management. [45]

National Ageing Research Institute

In its work with the Falls Risk for Hospitalised Older People (FRHOP),[46] the National Ageing Research Institute (NARI) developed the following five key recommendations for preventing falls in the emergency department setting:

- All emergency departments should have a policy that outlines procedures for screening, managing and referring older people presenting to the emergency department as a result of a fall.
- All emergency department staff should have the opportunity for orientation training and ongoing education that includes fall prevention policies and procedures, as well as research evidence to support these.
- An evidence-based screening procedure that identifies older people presenting to the emergency department and at risk of falls should be implemented independently or as part of an overall fall risk screen.
- All older people with an elevated fall risk should have modifiable fall risk factors addressed.
- All older people with a high fall risk identified during screening should have a comprehensive fall risk assessment conducted by a trained practitioner using a validated tool.

NARI also identified the following four best practice points for fall prevention in the emergency department:

- The older person's primary health provider should be informed of the risk screening result and subsequent referrals.
- The emergency department should identify a clear referral pathway for older people who are at higher risk of falls or have modifiable fall risk factors.
- Emergency department staff should communicate clearly with older people and their carers and families (to the extent the older person chooses) about the potential benefits and rationale for referrals and fall prevention interventions.
- Emergency departments should review the completion of fall risk screening and referral as part of their routine medical record audits.

5.3.4 Falls clinics

Falls clinics in Australia can be public or private and are often conducted as part of an outpatient service. The number of fall clinics in Australia is slowly increasing, and a referral from a general practitioner or service provider is usually required.

Falls clinics are staffed by a multidisciplinary team that can provide a falls assessment and advice on managing fall risk for older people who have fallen. [47] The team usually develops an intervention strategy for the older person, as well as advice, education and training for them, their carers and other members of the multidisciplinary team. Falls clinics can also refer the older person to mainstream health services for ongoing management.

Falls clinics should not be the first intervention for an older person who has fallen or who is at risk of falling.

Multifactorial case study

Decreasing the number of risk factors can reduce the risk of falling

Ms R is a 79-year-old woman who was transferred by ambulance to hospital from her residential aged care service (RACS) after fracturing her pelvis. This injury was the result of a fall onto the floor while she was rushing to the toilet.

The orthopaedic team admitted Ms R from the emergency department. Because the fracture was stable, she was allowed to walk and weight bear as pain permitted. Nursing staff implemented standard strategies for fall prevention. Since Ms R was admitted as a result of a fall, staff completed a fall risk assessment rather than a less detailed fall risk screen.

Information from the fall risk assessment and the accompanying transfer letter from Ms R's RACS revealed that she had multiple risk factors for falling, including that Ms R:

- was older than 65 years
- had fallen three times in the previous year
- was taking five different medicines, including a sleeping tablet and a diuretic
- completed a Timed Up and Go test (TUG) (one month prior to the fall) in 19 seconds with her wheelie walker. The mean time for healthy 71–79-year-old people is 15 seconds
- was frequently incontinent of urine at night and regularly rushed to the toilet
- had a Mini Mental State Examination (MMSE) score of 22/30 before falling and was frequently agitated (a score of less than 24 indicates cognitive impairment)
- had left foot pain as the result of severe hallux valgus
- wore bifocal glasses for all activities despite having a second pair of distance glasses for walking
- did not like to go outdoors and received no direct sunlight.

In addition to the standard strategies and in response to the risk assessment, the hospital staff implemented targeted, individualised interventions to reduce Ms R's risk of falling. These interventions included:

- a medicines review to minimise the risk of Ms R's medicine regime increasing her fall risk
- advice from the medical officer on the importance of getting enough sunlight for vitamin D to improve Ms R's bone mineral density
- advice from the occupational therapist about wearing well-fitting shoes with nonslip soles to assist in managing foot problems and improve mobility generally
- simple exercises for strengthening core body muscles for better balance, as demonstrated by the physiotherapist
- a continence assessment with a specialist continence service to assist in managing incontinence at night
- advice on the importance of wearing distance glasses when mobilising.

As a result of these multifactorial interventions, Ms R:

- has minimised the risk of medicine interactions and adverse medicine events
- has more restful sleep due to physical exertion throughout the day
- has better management of her urinary incontinence
- experiences fewer episodes of agitation
- has less pain in her left foot from her hallux valgus
- is able to clearly see the floor in front of her while walking
- has improved the condition of her muscles and bones.

The multidisciplinary teams at both the hospital and the RACS applied the principles of safe and high-quality transitions of care to ensure all parties were made aware of changes to Ms R's care through chart entries, case conferences and appropriate discharge correspondence. The changes in care were discussed with Ms R and her family during a case conference with the multidisciplinary team.

5.4 Special considerations for cognitive impairment

Falls and cognitive impairment are key concerns for older people and healthcare workers alike. Cognitive impairment has a dedicated chapter (Chapter 8) and is included as an area for special consideration.

Cognitive impairment, including agitation, delirium and dementia, is a major risk factor for falls. Older people who have cognitive impairment can benefit from falls interventions but will likely require individual tailoring of the interventions received.

Supervision

For older people experiencing delirium or cognitive impairment, where it is unsafe for them to mobilise or transfer without assistance, individual observation and surveillance must be increased within hospital, and help with transfers must be provided as required.

Ideally, one-on-one supervision should be used for those older people with a mobility impairment for which they lack insight (e.g., cognitive impairment) and who impulsively attempt to exit their bed or chair without assistance. [48]

Delirium in the hospital

Non-pharmacological interventions for older people experiencing delirium have been shown to significantly reduce falls in older people in hospitals. [49] This includes:

- providing a confused older person with orientation and supported mobility
- ensuring the older person is wearing their visual and hearing aids as prescribed
- maintaining the older person's sleep hygiene
- ensuring the older person receives adequate hydration, and
- reducing the older person's use of psychoactive medicines. [50]

6 Fall risk assessment for tailoring interventions

Recommendations

Education: Provide tailored education about fall prevention to older people who wish to participate, and to all staff and families. (Level 1B)

Personalised interventions: Provide personalised multifactorial fall prevention interventions for all older people based on an assessment of individual risk factors. (Level 2B) Calculating a fall risk score is not necessary. (Level 2B)

6.1 Background and evidence

In caring for older people, it is recommended that hospitals consider all older people at risk of falling and individually assess each older person to identify their fall risk factors. The fall risk assessment will determine which fall injury interventions are necessary to minimise the older person's risk of falls and harm from falls.

Note: Screening and assessment of fall risk alone does not prevent falls. Identified risks must be addressed by reliably implementing strategies shown to minimise the risk of falling and fall-related injuries.

6.1.1 Fall risk screening of all patients

A person-centred approach to care requires screening all patients for an increased risk of falls or harm from falls upon admission to hospital. Screening can help determine if the patient needs a more detailed fall risk assessment to identify fall risk factors that may be amenable to intervention.

Screening tools with reasonable accuracy in predicting people who fall while in hospital are the: [51, 52]

- St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY) Screen and its modifications, and
- Peninsula Health Falls Risk Assessment Tool – Part 1.

Benefits and risks of screening tools

If used appropriately, screening tools can ensure standardisation in assessment, provide guidance for junior staff, and, if part of routine clinical management, inform further assessment and care for patients.

Criticism of fall risk screening suggests that it is time-consuming and diverts hospital staff from other care duties. Additionally, if fall risk scores are relied upon, it may result in not delivering treatments to some patients with fall risk factors who score as low risk on the fall risk screen.

6.1.2 Fall risk assessment in hospitals

Fall risk assessment is used to identify an older person's underlying risk factors for falls and harm from falls. The factors contributing to an older person's increased risk of falling need to be identified systematically and comprehensively to inform an individualised plan for daily care focused on preventing falls. Assessment tools provide detailed information on the underlying deficits contributing to overall risk and should be linked to intervention and management.

When identifying the cause of a fall, whether the older person has presented to hospital following a fall or has experienced a fall while in hospital, it is important to remember that most falls occur as a result of an interaction between intrinsic and extrinsic factors. If an older person has multiple fall risk factors, their risk of falling increases. [53] Many disease processes that are more common in older people increase the risk of falls, mainly through impairing postural stability.

Different fall assessment tools may be more relevant to different hospital settings. Fall risk assessment tools vary in the number of risk factors they include and how each risk factor is assessed. See Table 6.1 for a range of fall risk assessment tools applicable to Australian hospitals.

6.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and developing an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

6.2.1 Fall risk screening

In hospitals that do not apply a targeted approach to preventing falls (that is, where not all admitted older people are considered at increased risk of falling), fall risk screening or triaging should occur as soon as practicable when an older person is admitted to the hospital.

Fall risk screening should be used to guide a more detailed fall risk assessment and subsequent targeted fall prevention interventions. The outcomes of the screening should be documented, reported to other healthcare staff, and discussed with the older person and their carers and family (to the extent the older person chooses).

If any fall risk factor on a fall risk screen is identified as being 'at risk', interventions should be considered for that risk factor – even if the older person has a low fall risk score overall. For example, if an older person has an overall score of 1 on the STRATIFY tool (consisting of a score of 1 for transfer limitations and 0 for other screening items), an intervention to address their mobility impairment should be considered.

6.2.2 Fall risk assessment

Applying a targeted approach to preventing falls by considering **all** older people admitted to hospital at high risk of falling and individually assessing each older person to identify their fall risk factors will support high-quality and timely care in the hospital.

A fall risk assessment should be repeated:

- when the older person's environment is changed
- when the older persons' health or functional status changes
- after a fall
- when the older person is to be discharged.

Responsibility for conducting a fall risk assessment

Due to the multifactorial nature of falls, it is preferable that different members of the multidisciplinary team (rather than a single member) assess the fall risk. However, if the multidisciplinary team is involved in the fall risk assessment process, responsibility for ensuring its timely completion should be allocated to one staff member. If a multidisciplinary approach is not possible, nursing staff may be primarily responsible for assessing fall risk, bringing in medical and other health professionals where needed.

For example, in acute hospitals, a multidisciplinary assessment is unlikely the best choice because not all older people are seen (or could be seen) for an assessment by an allied health professional within one to two days of admission.

[Point of interest] Managing fall risk assessments across disciplines

In its work with the Falls Risk for Hospitalised Older People (FRHOP)[46], the National Ageing Research Institute (NARI) identified several limitations when different health professionals from different disciplines perform elements of a fall risk assessment, compared with a single-discipline assessment. These limitations include:

- delays in filling in parts of the assessment
- confusion over who is coordinating the assessment
- confusion over who is ensuring the interventions are implemented.

To overcome these limitations, the health service should:

- establish clear protocols for using fall risk assessment tools, including which staff member(s) completes them, when they are completed, and how referrals and management options are initiated
- create a clear process for integrating components of the risk assessment, and
- use effective communication strategies to all staff about the process, level of risk and interventions being recommended for each older person.

6 Fall risk assessment for tailoring interventions

Fall risk assessment tools

When a fall risk assessment is introduced as a healthcare tool, it needs to be supported by education for staff and intermittent reviews to ensure it is used appropriately and consistently.

In any fall risk assessment, both intrinsic and extrinsic risk factors related to a person's health, functional status and environment need to be considered.

Most fall risk assessment tools focus solely on intrinsic fall risk factors, so a separate environmental assessment may be necessary to identify extrinsic fall risk factors (see Chapter 16).

The risk assessment tools recommended in Table 6.1 were chosen based on their applicability to Australian hospitals.

Table 6.1: Fall risk assessment tools

In the acute hospital setting	
Care plan assessment items	
Description	Twelve items are incorporated into the daily care plan, including intrinsic risk factors (such as medicines, vision, blood pressure, mobility, etc.), as well as environmental risk factors (safe environment, appropriate bed height, nurse call bell accessibility, etc.).
Time needed	Approximately 5–10 minutes
Criterion	No criterion for high fall risk. Individual risk factors identified are addressed according to guidelines.
In the subacute or rehabilitation setting	
Peninsula Health Fall Risk Assessment Tool (PH-FRAT)	
Description	The PH-FRAT consists of three sections: Part 1 – Fall Risk Status, Part 2 – Risk Factor Checklist, and Part 3 – Action Plan. The complete tool (including the instructions for use) is a full fall risk assessment tool. Part 1 can be used as a fall risk screen. The Hodkinson Abbreviated Mental Test Score is used within the PH-FRAT to assess cognitive impairment.
Time needed	Approximately 15–20 minutes
Criterion	A score of 12 or more indicates an increased risk of falls.
Fall Risk for Hospitalised Older People (FRHOP) [46]	
Description	The FRHOP is a comprehensive risk assessment tool that includes a broad range of fall risk factors, most of which are graded from nil (0) to high (3) risk. The tool has accompanying strategies that can be used to develop an action list. It also has additional actions for minimising overall risk.
Time needed	Approximately 20 minutes
Criterion	An overall score of 23 or more, or more than four items rated as high risk, indicates an increased risk of falls.

6 Fall risk assessment for tailoring interventions

In the subacute or rehabilitation setting	
Peter James Centre Fall Risk Assessment Tool (PJC-FRAT)	
Description	The PJC-FRAT is a multidisciplinary fall risk assessment tool (medical, nursing, physiotherapy and occupational therapy staff assessment components). Four main interventions are linked to the assessment: fall risk alert card, additional exercise, fall prevention education, and hip protectors.
Time needed	Approximately 15 minutes
Criterion	No criterion for high fall risk. Individual risk factors identified are addressed according to guidelines.

Fall risk factors

The fall risk factors listed in Table 6.2 below have been identified as being more prevalent in fallers than in non-fallers. [54-56] Therefore, if an older person is presenting with any of these risk factors, a more specific assessment may be indicated. A description of the appropriate assessment tools can be found in the respective chapters, as shown in the table.

The outcomes of the fall risk assessment, together with the recommended strategies to address identified risk factors, need to be documented, reported to other healthcare staff and discussed with the older person and their carers and family, where appropriate.

6 Fall risk assessment for tailoring interventions

Table 6.2: Specific fall risk factor assessments

Risk factor	Components	Assessments	Detailed information
Impaired balance and mobility	Poor balance	Functional Reach Test	Chapter 7
	Reduced mobility	Mobility interaction fall chart, Six-Metre Walk Test, Timed Up and Go Test, Short Physical Performance Battery, Physiotherapy assessment for walking aid use	
	Muscle weakness	Sit-to-Stand Test	
Cognitive impairment	Dementia or delirium	Folstein Mini-Mental State Examination Rowland Universal Dementia Scale; Confusion Assessment Method, 4AT rapid clinical test for delirium	Chapter 8
	Cognitive impairments in specific domains, including executive function	Montreal Cognitive Assessment Test, Trial Making Test Part B	
Medicines	Benzodiazepines	Medicines review	Chapter 9
	Antidepressants	Medicines review	
	Antiepileptic medicines and medicines that lower blood pressure	Medicines review	
	Some cardiovascular medicines	Medicines review	
Incontinence	Urinary and faecal	Questionnaires, assessment, physical examination	Chapter 10
Feet and footwear	Footwear analysis Foot problems (i.e., bunions, corns) and deformities	Safe shoe checklist Podiatrist assessment	Chapter 11
Syncope	Postural hypotension	Lying and standing blood pressure measurements	Chapter 12
	Carotid sinus hypersensitivity	Carotid sinus massage by a medical specialist	
Dizziness and vertigo	Benign paroxysmal positional vertigo	Dix–Hallpike test	Chapter 13
	Peripheral vestibular function	Head thrust test	
Vision	Visual acuity	Snellen eye chart, Landolt C, chart pictorial vision tests	Chapter 14
Environment	Impaired mobility, visual impairment	Environmental checklist	Chapter 16

6 Fall risk assessment for tailoring interventions

Assessing fall risk in the emergency department

Two fall risk screening and assessment tools with validity for use in the emergency department for measuring fall risk factors and tailoring subsequent interventions are the:

- Prevention of Falls in the Elderly Trial (PROFET) falls assessment proforma, which uses a dichotomous classification (present or absent) for each risk factor [43], and
- CAREFALL Triage Instrument, which assesses eight modifiable fall risk factors for recurrent falls. [57]

The FROP-Com [58] and the two-item fall risk screening tool [59] have limited predictive ability in the emergency setting.[60]

Case study

Falls risk screening and assessment

Ms S, aged 82 years, presented to her local hospital after a fall with substantial bruising and a possible broken hip. An X-ray revealed no fracture; however, Ms S was admitted because severe pain limited her walking so that she could take only a few hobbling steps. Ms S had had three falls in the past 12 months, had impaired vision, nocturia and urinary frequency, and difficulty with transfers and mobility.

Once Ms S was given pain relief, her pain settled and her mobility improved over the next three days. The nurse performed a detailed fall risk assessment using the Fall Risk for Hospitalised Older People (FRHOP), and a referral and management program was implemented, mostly linked to Ms S's discharge planning as she was discharged home two days later. This included an assessment by the ward physiotherapist, who gave Ms S a balance and strengthening exercise program to do at home. The assessment results and management plan were provided to Ms S's general practitioner, and she was referred to:

- a community physiotherapist for ongoing management of her resolving hip pain and balance problems
- an ophthalmologist, who identified cataracts and booked Ms S into cataract surgery
- an occupational therapist, who undertook a home environment assessment and recommended multiple home modifications
- a continence specialist to manage her continence problems.

Six months later, Ms S's family was pleased to note that Ms S had resumed all her previous activities and had experienced no further falls.

6.3 Special considerations for cognitive impairment

Identifying cognitive impairment in an older person should be part of the fall risk assessment process.

The presence of cognitive impairment may mean that the multifactorial fall risk assessment tool needs to be modified to ensure it is suitable for the older person, particularly if the older person has problems understanding one or more instructions.

The desired fall prevention interventions may also need to be adjusted to suit older people with cognitive impairment. Often, the older person's carers or family (to the extent the older person chooses) can play a role in implementing fall prevention actions, particularly in preparation for discharge and after return home. [61]

Additional information

- The NSW Fall Prevention & Healthy Ageing Network has a range of resources to support fall prevention, including fall screening and assessment tools:
  - ☐ Peninsula Health Fall Risk Assessment Tool (PH-FRAT) is comprised of 3 parts. Part 1 can be used as a falls risk screen.
  - ☐ Ontario Modified Stratify Falls Risk Screen
  - ☐ The Falls Risk Assessment and Management Plan developed by WA Health contains multiple, specific actions for addressing fall risk factors relating to mental status, vision, toileting, transfers and mobility, and medicines
  - ☐ Prevention of Falls in the Elderly Trial (PROFET) [43]

7 Balance and mobility

7.1 Background and evidence

Balance plays an essential role in managing everyday activities. Increasing age, inactivity, disease processes and muscle weakness contribute to impaired balance.

An older person's balance, mobility and strength are often poorer when they are in hospital and may further deteriorate during a hospital stay because of illness and because hospital environments discourage mobility. Safe mobilisation should be encouraged and supported by health professionals.

As part of a mobility assessment, it is important to establish whether an older person's level of mobility in hospital is usual for them.

7.1.1 Identifying the risk factors for falls

An older person's balance, mobility and strength are often poorer when they are in hospital, compared with their usual level of function. This may be due to the effects of medicines (including anaesthetics), acute events (e.g. stroke or a hip fracture) and acute illnesses (e.g. infections). Balance and mobility may further deteriorate during a hospital stay if the older person is less active than usual due to their medical condition or the hospital environment, which discourages mobility. Therefore, as part of a mobility assessment, it is important to establish whether an older person's level of mobility in hospital is usual for them.

Assessment of balance or mobility as a single factor for fall risk may be inadequate for predicting falls in older people when in hospital, even in rehabilitation settings. [62]

Best practice requires a fall risk assessment that considers multiple fall risk factors for older people in hospital. The most common fall risk factors for older people in hospital include experiencing cognitive impairment or agitation, use of psychoactive medicines, gait instability, urinary incontinence or frequency, and fall history. [54]

7.1.2 Exercise for preventing falls and harm from falls

Exercise programs for older people during a hospital stay benefit functional mobility and reduce the risk of falls while they are in hospital. [63] Older people who have undergone inpatient rehabilitation after stroke [64] and hip fracture [65-67] were shown to have better outcomes and improved mobility when in-hospital exercise programs were delivered as part of usual rehabilitation care.

In subacute hospital settings with lengths of stay of at least three weeks, one study showed that an intervention including exercise, education, fall risk alert cards and hip protectors in addition to usual care reduced fall rates by 30%.[68]

As acute aged care and short-stay subacute settings have an average stay of one week, it is difficult to evaluate hospital fall prevention programs in these settings. [69]

7.1.3 Discharge planning and exercise

Older people who have been in hospital often have a particularly high risk of falling once they return home. [70, 71] For example, studies have found that one in seven older people fell within one month of returning home [37] and that three in four older persons with stroke fell within six months of leaving hospital. [72] This shows the importance of discharge or post-hospital care planning. [70]

Well-designed exercise programs can prevent falls in older people living in the community. [73] Therefore, it makes sense that when older people leave hospital, referrals should be made for ongoing exercise programs.

7 Balance and mobility

7.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and developing an individualised care plan that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

7.2.1 Assessing balance, mobility and strength

Assessing an older person's balance, mobility and strength is a key element in understanding their fall risk in hospital and forms part of the fall risk assessment process.

A physiotherapist or other appropriately trained health professional should conduct the assessment of an older person's balance, mobility and strength to design and deliver a tailored exercise program as part of the older person's multifactorial fall prevention intervention.

The different measurement tools listed in Table 7.1 for assessing an older person's balance, mobility and strength have been evaluated according to their reliability, validity and responsiveness to change. The choice of tool will depend on the time and equipment available. The criteria and ratings are derived from older people living in the community setting.

Table 7.1: Clinical assessments for balance, mobility, strength and gait

Tools for assessing balance	
Functional reach [74]	
Description	The Functional Reach is a measure of balance and is the difference between a person's arm length and maximal forward reach, using a fixed base of support.
Time needed	1–2 minutes
Level that is predictive of a fall	≤ 25 cm: 2x greater than normal risk of falling ≤ 15 cm: 4x greater than normal risk of falling Unwilling to reach: 8x greater than normal risk of falling
Alternate Step Test [75]	
Description	The Alternate Step Test is a measure of lateral stability. It involves measuring the time taken to complete eight steps, alternating between the left and right foot, as fast as possible, onto a step 19 cm high and 40 cm deep.
Time needed	1–2 minutes
Level that is predictive of a fall	> 10 seconds

7 Balance and mobility

Tools for assessing mobility	
Six-Metre Walk Test [75, 76]	
Description	The Six-Metre Walk Test measures a person's gait speed in seconds along a corridor (over a distance of six metres) at their normal walking speed.
Time needed	1–2 minutes
Level that is predictive of a fall	>6 seconds
Timed Up and Go Test (TUG) [77, 78]	
Description	The TUG measures the time it takes for a person to rise from a chair, walk three metres at a normal pace with their usual assistive device, turn, return to the chair and sit down.
Time needed	1–2 minutes
Level that is predictive of a fall	>15 seconds
Tools for assessing strength	
Sit-to-Stand Test [75, 79]	
Description	The Sit-To-Stand test is a measure of lower limb strength and is the number of stands a person can complete in 30 seconds (rather than the time it takes to complete a pre-determined number of repetitions). That way, it is possible to assess a wide variety of ability levels, with scores ranging from 0 for those who cannot complete 1 stand to greater than 20 for more fit individuals.
Time needed	1–2 minutes
Level that is predictive of a fall	A below-average number of stands for the patient's age group indicates a high risk of falls: Women +65 years, below average) <11 Men +65 years, below average <12
Knee extension strength [80]	
Description	Knee extension strength is measured while participants are seated. Three trials are performed, and the greatest force is recorded.
Time needed	5 minutes
Level that is predictive of a fall	< 15 kg force.

7 Balance and mobility

Composite scales for assessing balance and gait	
Berg Balance Scale [81]	
Description	The Berg Balance Scale is a 14-item scale designed to measure the older person's balance in a clinical setting, with a maximum total score of 56 points.
Time needed	15–20 minutes
Level that is predictive of a fall	A score of ≤20 = high risk of falls A score of ≤40 = moderate risk of falls (potential ceiling effect with less frail people)
De Morton Mobility Index (DEMMI) [82]	
Description	The DEMMI is a 15-item mobility scale that includes ranging from simple tasks such as bridging or rolling on a bed to more difficult tasks such as walking backwards and jumping.
Time needed	<10 minutes
Level that is predictive of a fall	Lower scores indicate poorer mobility. A criterion for falls has not been determined.
Tinetti Performance-Oriented Mobility Assessment Tool (POMA) [83]	
Description	POMA measures a person's gait and balance. It is scored on the person's ability to perform specific tasks, with a maximum total score of 28 points.
Time needed	10–15 minutes
Level that is predictive of a fall	A score of <19 = high risk of falls A score of <24 = moderate risk of falls
Confidence and falls efficacy scale	
Falls Efficacy Scale - International (FES-I) [84]	
Description	FES-I provides information on the level of concern on a four-point scale (1 = not at all concerned to 4 = very concerned) across 16 activities of daily living (e.g. cleaning the house, simple shopping, walking on uneven surfaces).
Time needed	5 minutes
Level that is predictive of a fall	A score of ≤22 = low to moderate level of concern A score of ≥23 = high level of concern

7.2.2 Balance and mobility as part of multifactorial intervention

Inpatient rehabilitation – which includes mobility, balance and strength exercises and structured training programs – has been shown to be effective when part of multifactorial fall prevention interventions for older people in hospital. A physiotherapist or suitably qualified health professional should design and deliver the exercise program.

Hospital staff should provide the older person with opportunities to be as active as possible throughout the day. For example, the older person's bed rest should be minimised during the day, and they should be encouraged to be mobile by increasing the amount of incidental activity, such as walking to the toilet with appropriate supervision. [72] [85]

Case study

Ms B is 83 years old and was admitted to hospital with a urinary tract infection. She was confused and unable to walk on her own as she normally did. The nursing staff ensured that Ms B did not walk unsupervised, that frequently used items such as glasses were within easy reach, and that family members visited to provide additional supervision.

As part of a multifactorial fall prevention program, the physiotherapist assessed Ms B and provided daily balance and mobility training, which improved her function and mobility so that she was independent with a walking stick before she was discharged. The physiotherapist also referred Ms B to a community-based balance and strength program after she left hospital.

7.3 Special considerations for cognitive impairment

Risk factors for falls, such as gait and balance problems, are more prevalent in older people with cognitive impairment than in those without cognitive impairment. [86-88] People with cognitive impairment should, therefore, have their fall risk investigated comprehensively.

Interventions that are effective for older people without cognitive impairment should not be withheld from cognitively impaired older people unless the person is unable to follow or comply with instructions or chooses not to participate (see Chapter 8 on cognitive impairment).

Simplifying instructions and using picture boards and demonstrations are strategies that may improve the quality of exercise for older people with cognitive impairment. Carers, family members, or volunteers may be able to help supervise and motivate older people with cognitive impairment to participate in exercise programs.

Additional information

The Physiotherapy Evidence Database (PEDro) provides evidence-based information from randomised controlled trials, systematic reviews and evidence-based guidelines in physiotherapy.

The following organisations have manuals, exercise programs and resources available:

- NSW Fall Prevention and Healthy Ageing Network.

8 Cognitive impairment

8.1 Background and evidence

Although cognitive impairment is strongly associated with increasing age, it is a complex problem that may exist in all age groups due to intellectual disability, acquired brain injury, mental health conditions and other medical conditions. Cognitive impairment implies a deficit in one or more cognitive domains, such as memory, visuospatial skills or executive function. It is not synonymous with dementia.

Dementia

Dementia is a major neurocognitive disorder. [89] Features include significant cognitive decline from a previous level of performance in one or more cognitive domains that affect a person's ability to independently undertake everyday activities. Another disorder, such as delirium or depression, must not better explain the cognitive deficits. [89]

Dementia is one of the most common forms of cognitive impairment in older people, with approximately 450,000 Australians estimated to be living with dementia. [15]

Dementia often has a gradual onset with progressive decline in a range of cognitive abilities, such as attention, memory, orientation, learning, language, executive function and visuospatial ability. Changes in personality, behaviour and social cognition commonly accompany dementia. [90]

Delirium

Delirium is a syndrome characterised by the rapid onset of variable and fluctuating changes in mental status. Delirium usually develops over hours or days and has a fluctuating course that can involve changes in a range of cognitive abilities, such as orientation, mood, perceptions, psychomotor activity and the sleep-wake cycle. [91]

Delirium is common in older people when they are in hospital. Estimates of the prevalence of delirium range from 15% to 56% of older people. [91]

Certain kinds of surgery are associated with an especially high risk of developing delirium. For example, 43% to 61% of older people having orthopaedic surgery for hip fractures [92] and approximately 30% of people who have had heart surgery [93] are at risk of developing delirium.

Older people with existing cognitive impairment are more likely to develop delirium associated with an acute illness. [91]

Dementia or delirium

Differentiating between dementia and delirium can be difficult, and the two conditions can coexist. Witness reports are often used to gain insight into timing, chronicity and severity to differentiate dementia and delirium.

People with dementia are more susceptible to delirium if they:

- have constipation, a urinary tract infection, a chest infection or are experiencing pain
- have visual or auditory impairment, are older or are malnourished
- are physically restrained
- have a urinary catheter in place
- take multiple psychoactive medicines. [91]

The prevention of delirium is generally more effective than early detection and treatment. Delirium is almost always due to a treatable underlying cause and should be addressed as soon as possible.

8 Cognitive impairment

8.1.1 Cognitive impairment associated with increased fall risk

Older people with cognitive impairment have an increased risk of falls. [94] Cognitive impairment may increase the risk of falling by directly influencing an older person's ability to evaluate and respond to their environment and safely carry out everyday activities.

In the hospital environment, the presence of confusion or disorientation in older people has been independently associated with falls [94,95-98] and fractures. [99] Dementia has also been associated with falls and falls with fractures in hospitals. [100]

Fall risk factors for people with cognitive impairment

Risk factors for falls are more prevalent in older people with cognitive impairment than in people without cognitive impairment. [101] For example, impairments of gait and balance are worse in older people with cognitive impairment, [86, 102] psychoactive medicines are more commonly prescribed, [102,103-105] and orthostatic hypotension and hypotension are more prevalent. [106, 107]

Fall risk factors related to cognitive impairment include:

- reduced problem-solving ability
- reduced processing speed and visuospatial ability
- increased impulsiveness
- anxiety and depression
- poor gait, mobility and balance [102,87, 88, 108, 109]
- reduced dual-task ability [110]
- for some with greater cognitive decline and preserved mobility, an increased tendency to wander [111-113]
- fear of falling, with some studies reporting a prevalence of fear of falling in older people with cognitive impairment of more than 50%. [114]

8 Cognitive impairment

Table 8.1: Fall risk factors associated with cognitive impairment

Fall risks associated with cognitive impairment	
Unmet need	The behavioural and psychological changes often associated with dementia are commonly a sign of unmet need. For example, thirst, hunger, pain and needing to use the bathroom. [115]
Changes in Environment	Changes in the environment can contribute to changed behaviours such as confusion and agitation. [116] These behaviours may subsequently increase the risk of falls. [115] Changes in the environment include: ■ transfers between home and hospital ■ between hospital and home or a residential aged care service ■ transfers within or between rooms within a hospital.
Medicines	Psychoactive medicines are more commonly prescribed in older people with cognitive impairment and have been associated with an increased fall and fracture risk. [102,103-105]
Orthostatic hypotension	Orthostatic hypotension is more prevalent in older people with cognitive impairment. Note: Older people with cognitive impairment may not report symptoms associated with their blood pressure dropping following lying to standing blood pressure assessments, which increases the risk of falls. [106, 117]
Depressive symptoms	Depressive symptoms have been independently associated with falls in community-dwelling older people with cognitive impairment. [102,118, 108]
Specific types of cognitive impairment	Specific types of cognitive impairment appear to affect fall risk through different mechanisms. [117-119] For example: ■ People with Vascular and Lewy body dementia have significantly poorer gait and functional performance compared to older people with Alzheimer's disease [117] ■ Vascular dementia is associated with a higher incidence of orthostatic hypotension [120] ■ Lewy body dementia is associated with symptomatic postural hypotension and a higher incidence of orthostatic hypotension [121] ■ Delirium is associated with acute medical illness, metabolic disturbance, medicines and sepsis [91], which may lead to poor balance, postural hypotension and muscle weakness.
Global cognition	Even though global cognition does not appear to be associated with fall status among older people with cognitive impairment, [109] it confers a moderate to high risk of serious fall-related injury. [120]
Executive function	Executive function impairment, slower processing speed and poorer visuospatial ability should be included as part of a fall risk assessment in older people with cognitive impairment. [102,88]
Balance, mobility and gait	As with cognitively healthy older people, impairments in balance, mobility and gait [102, 108, 122] and lower levels of physical activity [102,118] have been associated with falls in older people with cognitive impairment.

8 Cognitive impairment

8.1.2 Behaviour support plans

In Australia, residential aged care service (RACS) providers are required to have a behaviour support plan in place for older people in the RACS who require or may require the use of restrictive practices as part of their care. [123] If relevant, the behaviour support plan will include information about how best to manage fall risk for the older person, considering their individual needs and circumstances.

Behaviour support plans are designed to inform the older person's ongoing care needs and enable ongoing updates as behaviour changes are observed or occur, or to reflect any new information which is received about the older person.

If an older person from a RACS who has a behaviour support plan in place is admitted to hospital, health professionals at the hospital should use the behaviour support plan to inform the individual care plan for the older person while in hospital.

8.1.3 Cognitive impairment and fall prevention

Successful fall prevention trials conducted in hospitals found that older people with cognitive impairment and dementia can comply with fall prevention programs. [124-126]

A multifactorial program for older people with a hip fracture that includes comprehensive geriatric assessment and rehabilitation, including prevention, detection and treatment of fall risk factors, has been shown to prevent falls and injuries in older people with dementia in hospital. [125, 127]

In the subacute hospital setting, a targeted fall prevention program – which used a fall risk alert card with an information brochure, an exercise program, an education program and hip protectors, in addition to usual care for older people with cognitive impairment – reduced the incidence of falls. [68]

Preventing and managing delirium in hospital

There is meta-analysis evidence that non-pharmacological multifactorial interventions are effective in preventing delirium in hospitalised older people. This includes:

- physiotherapy
- reorientation training
- early mobilisation
- identification and treatment of underlying causes or postoperative complications
- pain control
- regulation of bowel and bladder function
- hydration and nutrition
- oxygen delivery. [126]

8.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences, and developing an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

8 Cognitive impairment

8.2.1 Assessing cognitive impairment

One of the most important initial steps in preventing falls in older people is to assess for cognitive impairment. This should include the following strategies:

- **Assess for the presence of dementia or delirium**, as the rapid diagnosis and treatment of delirium and its underlying precipitants (e.g. infection, dehydration, constipation, pain) are crucial. [90]
- **Review the older person's medicines** for combinations that may contribute to an alteration in cognitive status.
- **Review the older person's behaviour support plan** when one is available.
- **Treat medical conditions** that may contribute to an alteration in cognitive status.
- **Conduct a detailed assessment** with older people who have a progressive decline in cognition to determine diagnosis and, where possible, treat reversible causes. [128]
- **Assess fall risk factors** for an older person with cognitive impairment and identify appropriate fall risk interventions to reduce the older person's fall risk. [129]

Some interventions, such as exercise, require the older person to be able to follow instructions or comply with a program. When the older person has difficulty following instructions safely, the multidisciplinary team should tailor the fall prevention program to ensure it is as effective as possible.

Tools for assessing cognitive impairment

The more common cognitive screening tools for use in hospitals are summarised in Table 8.2.

The Rowland Universal Dementia Assessment Scale (RUDAS) is a simple tool designed for use in multicultural populations, such as in Australia. [130]

For remote living Aboriginal and Torres Strait Islander peoples, the Dementia Guidelines recommend the use of the Kimberley Indigenous Cognitive Assessment, [131] an assessment of cognitive function developed specifically for Aboriginal and Torres Strait Islander peoples. However, the quality of evidence is low.

The World Guidelines for Fall Prevention [13, 132] recommend that cognitive screening tests include executive function components such as the Montreal Cognitive Assessment (MoCA)[133] or specific executive function tests such as the Trail Making Test part B. [134]

Information about other tools to assess a person's cognitive status is available at:

- ☐ Clinical practice guidelines and principles of care for older people with dementia
- ☐ Dementia Outcomes Measurement Suite

8 Cognitive impairment

Table 8.2: Tools for assessing cognitive status

Tools for assessing cognitive status	
Psychogeriatric Assessment Scales (PAS)	
Description	PAS assesses the clinical changes seen in dementia and depression. Three scales are derived from a face-to-face interview with the person (cognitive impairment, depression, stroke), and three scales are derived from a face-to-face interview with an informant, such as a carer (cognitive decline, behaviour change, stroke). The PAS is easy to administer and score and can be used by lay interviewers.
Time needed	20 minutes
Criterion	A score of 0–3: no or minimal cognitive impairment A score of 4–9: mild cognitive impairment A score of 10–15: moderate cognitive impairment A score of 16–21: severe cognitive impairment
Folstein Mini-Mental State Examination (MMSE)[135]	
Description	The MMSE is an 11-question measure that tests five areas of cognitive function: orientation, registration, attention and calculation, recall and language. The maximum score is 30.
Limitations	Significant limitations with Aboriginal and Torres Strait Islander peoples and culturally and linguistically diverse and poorly educated populations.
Time needed	5–10 minutes
Criterion	A score ≤23 indicates mild cognitive impairment A score ≤18 indicates severe cognitive impairment
Accuracy	Score ≤23 to detect dementia, 85-89% sensitivity [136, 137]
Rowland Universal Dementia Scale (RUDAS)[130, 138]	
Description	RUDAS is a simple method for detecting cognitive impairment. RUDAS is valid across cultures, portable, and easily administered by primary health professionals. The test uses six items to assess multiple cognitive domains, including memory, praxis, language, judgment, drawing and body orientation.
Time needed	10 minutes
Criterion	Cut point of 23 (maximum score of 30)
Accuracy	89% sensitivity; 98% specificity

8 Cognitive impairment

Confusion Assessment Method (CAM) [139]	
Description	CAM is a comprehensive assessment instrument that screens for four clinical features of delirium: 1. an onset of mental status changes or a fluctuating course 2. inattention 3. disorganised thinking 4. altered level of consciousness (i.e. other than alert).
Time needed	5 minutes
Criterion	An older person is diagnosed as delirious if they exhibit both the first two features and either the third or fourth features.
Accuracy	94% sensitivity; 90% specificity [140]
Montreal Cognitive Assessment (MoCA)[51]	
Description	MoCA is a brief cognitive screening tool for mild cognitive impairment and is also highly sensitive to dementia. It consists of 30 questions and assesses several cognitive domains, including orientation, attention, memory, visuospatial abilities, language and executive function. There are adapted versions for people who are not literate or have a limited educational background, as well as those who are visually impaired. The maximum score is 30.
Time needed	10 minutes
Criterion	A score of 18-25 indicates mild cognitive impairment A score of 10-17 indicates moderate cognitive impairment A score of < 10 indicates severe cognitive impairment
Accuracy	Score ≤25 to detect mild cognitive impairment: 80-95% sensitivity 76-87% specificity Score ≤25 to detect Alzheimer's disease: 100% sensitivity 76-87% specificity

8 Cognitive impairment

Trail-Making Test for Screening, Part B	
Description	The Trail Making Test is a 2 part neuropsychological test of visual attention and task switching. It can provide insights into a person's cognitive function based on how fast they can search, scan and process visual information without losing track of what they are doing. Part B consists of 25 circles over a piece of paper, with each circle containing either a number (1 – 13) or a letter (A – L). The patient is asked to draw lines to connect the circles in an ascending pattern, alternating between the numbers and letters (i.e., 1-A-2-B-3-C, etc.). The patient must connect the circles as quickly as possible without lifting the pen from the paper. Time the patient as they connect the "trail." If the patient makes an error, point it out immediately and allow the patient to correct it. Errors affect the patient's score by increasing the time it takes to complete the task. It is unnecessary to continue the test if the patient has not completed both parts after five minutes have elapsed.
Time needed	5 mins
Criterion	The test is scored based on the overall time (in seconds) required to complete the connections accurately. Suggested scoring is: Ages 55-75 years, average ≤101 seconds, deficient ≥273 seconds Ages 75-98 years, average ≤128 seconds, deficient ≥273 seconds
Accuracy	The test accuracy can vary based on the condition being diagnosed. The test doesn't give a clear indication of which function is impaired – this needs to be interpreted. Older age can skew the results if adjustments are not made.

8.2.2 Fall prevention for people with cognitive impairment

If a person is assessed to have cognitive impairment, a fall risk assessment should include additional focus on the fall risk factors listed in Table 8.1.

Similarly, for older people without cognitive impairment, the fall risk assessment will identify fall risk factors that can be addressed as part of a multifactorial fall prevention program for the person with cognitive impairment.

When developing a fall prevention program for people with cognitive impairment, consider the person's ability to follow instructions safely and ensure they have any additional supports they may need to understand or follow the program. Communicate this to the hospital workforce.

Fall prevention interventions for people with cognitive impairment

Fall prevention interventions that are considered appropriate to support older people with cognitive impairment as part of a multifactorial program include:

- Review previously prescribed medicines for conditions that the older person no longer has or where the risk to the older person exceeds the benefit. For example, antidepressants, antipsychotics, antihypertensives and antianginals. [61]
- Treat orthostatic hypotension as required. Orthostatic hypotension is common in older people with dementia. [61]
- Use physical training programs to improve an older person's gait, balance, mobility and flexibility. [61]
- Modify the environment to reduce slips and trips, such as lowering beds. [61]
- Eliminate the inappropriate use of restrictive practices or immobilising equipment, including indwelling catheters. [129]
- Provide more frequent observation, supervision, and assistance to ensure that older people with cognitive impairment who are unable to stand and walk safely receive help with all transfers. [61]
- Use fall-alarm devices (sometimes called movement alarms) to alert staff that older people with cognitive impairment are attempting to mobilise. [129]

Managing symptoms of cognitive impairment

The following general care principles are not directly aimed at preventing falls, but can assist in the management of the symptoms of cognitive impairment and delirium in older people: [91,141]

- Identify and reduce or eliminate the causes of agitation, wandering and impulsive behaviour.
- Avoid the risk of dehydration by having fluids available and within an older person's reach and by offering fluids regularly.
- Avoid extremes of sensory input (e.g. too much or too little light, too much or too little noise).
- Promote exercise and activity programs. Activity programs may need to be intensified in the late afternoon or early evening to redirect agitated behaviours. For example, pacing may be redirected into walking or dancing; noises may be redirected into singing or music playing.
- Promote companionship if appropriate.
- Establish orientation programs that use environmental cues and supports, including making personal or familiar items readily available. Repeat orientation and safety instructions regularly, keeping them simple and consistent.
- Develop a schedule for the older person. For example, regular eating times, regular activity times, and a regular and proactive toileting regime). Where possible, base this schedule on established individual routines. Ensure the workforce is aware of the schedule so that procedures, routines, and the older person's environment can remain consistent.
- Encourage sleep without the use of medicines and promote and support uninterrupted sleep patterns by reducing noise and minimising disturbance.
- Encourage older people to participate in activities to avoid excessive daytime napping.

- Ensure personal needs are met on a regular and timely basis.
- When communicating with people with cognitive impairment, try to instil feelings of trust, confidence and respect, thereby minimising the chance of provoking an aggressive response. This can be achieved by:
  - ☐ approaching the person slowly, calmly and from the front
  - ☐ respecting personal space
  - ☐ addressing the person by name and introducing yourself
  - ☐ using eye contact, and
  - ☐ speaking clearly and simply.
- Gentle touch and gestures, as well as auditory, pictorial and visual cues used appropriately, may also help when communicating with people with cognitive impairment.
- When speaking, use repetition and paraphrasing to allow the older person time to process the information, helping them understand what is being said.

[Point of interest] Strategies for maintaining hydration in older people

Older people with cognitive impairment may become dehydrated easily, which can lead to delirium. An Australian study employed strategies developed by the Joanna Briggs Institute's Practical Application of Clinical Evidence System to maintain oral hydration in older people residing in aged care services. [141] Although adherence was problematic, the following recommended strategies may also be beneficial for older people in hospital:

- Drinks, including cordial, juice, and water, but excluding caffeinated beverages, were offered by staff every 1.5 hours, along with morning tea, afternoon tea, and supper rounds.
- Older people with cognitive impairment were either helped or prompted to drink.
- An accessible water fountain was set up with a supply of cups.
- Jugs of water and cups were placed on all tables.
- Drinks were always given with medicines.
- Icy poles, jellies and ice cream were offered throughout the day as snacks and enjoyable treats.
- Fruit with a high water content (e.g., grapes, peeled mandarins) was placed on kitchen tables for easy access and picking.
- Light broths were given with meals.
- Happy hour was introduced twice a week, with non-alcoholic wines, mocktails, soft drinks and nibbles.
- Warm milk drinks were given to help older people settle at night.

Case study

Mr T is an independent, cognitively intact 79-year-old man living with his wife in the community. He was admitted to hospital with respiratory distress and a history of partial blindness and diabetes.

Following his admission, Mr T's condition deteriorated, and he became acutely confused secondary to a respiratory tract infection. He pulled out his intravenous line through which he was receiving antibiotics.

During the phase of significant agitation, the ward staff organised a roster with Mr T's wife and family, allowing a family member to sit with him as often as possible. As his delirium began to settle, the need for constant one-on-one supervision decreased, but the staff used a seat alarm device to alert them if Mr T tried to get up without the necessary supervision. After active treatment of the infection, Mr T's delirium resolved, and the alarm mat was removed.

8 Cognitive impairment

Additional information

A range of resources are available from the following associations and websites:

- Cognitive impairment program resources, Australian Commission on Safety and Quality in Health Care.
- Delirium Clinical Care Standard, Australian Commission on Safety and Quality in Health Care.
- Australian Clinical Practice Guidelines and Principles of Care for People with Dementia, Cognitive Decline Partnership Centre.
- Clinical Practice Guidelines for the Management of Delirium in Older People, Victorian Department of Health.
- Kimberley Indigenous Cognitive Assessment, University of Western Australia.
- Information, counselling and support for older people with dementia, their families and carers are available from Dementia Australia.
- The Care of Confused Hospitalised Older Persons program provides best practice principles for older people with confusion in hospital, NSW Agency for Clinical Innovation.
- The Allies in Dementia Health Care Project provides resources for allied health professionals supporting older people with dementia as part of the NSW Agency for Clinical Innovation.
- Understanding Dementia Massive Open Online Course (MOOC) is a free online course offered by the Wicking Dementia Research and Education Centre at the University of Tasmania.
- The Dementia Outcomes Measurement Suite is a compendium of validated tools for assessing various aspects of dementia by health professionals at the Australian Dementia Centre for Research Collaboration.
- The Dementia Training Australia provides resources for consumers and health professionals on dementia, helping to translate dementia research into practice through Dementia Training Australia.
- Montreal Cognitive Assessment.

9 Medicines and Medication Review

Medicines safety is an important consideration for reducing falls and harm from falls in older people and others at risk in hospitals.

Hospital policies and processes should ensure that clinicians safely prescribe, dispense and administer appropriate medicines, monitor medicine use and ensure people at risk of falls are informed about medicines. It is also important that the older person understands their own medicine needs and the associated risks.

9.1 Background and evidence

Epidemiological studies have shown an association between the use of medicines and falls in older people. [142-148] The risk of falls can be increased by medicines interaction, unwanted side effects (such as dizziness) and the desired effects of medicines (such as sedation).

It is important that the whole multidisciplinary team recognises that older people can have different or unexpected responses to medicines, which can lead to potentially avoidable events, such as falls and fractures, and monitor for any behaviour changes that need to be assessed.

9.1.1 Medicine use and increased fall risk

The ageing process, as well as disease, can affect an older person's ability to deal with and respond to medicines, which can lead to an increased risk of falls.[149] Relating factors include:

- **changes in pharmacokinetics:** the time course by which the body absorbs, distributes, metabolises and excretes medicines
- **changes in pharmacodynamics:** the effect of medicines on cellular and organ function
- **not adhering to medicine therapy:** including medicines misuse, underuse, overuse, or inappropriate prescribing [150]
- **the cumulative impact of medicines:** is associated with polypharmacy, particularly with respect to cumulative anticholinergic burden caused by multiple medicines that are not typically considered to have anticholinergic effects.

Classes of medicines

Medicine classes that increase the risk of falling in people aged 60 years and over include opioids, sedatives and hypnotics, neuroleptics and antipsychotics, antidepressants, benzodiazepines and certain classes of cardiovascular medicines. [151-153]

Certain classes of medicines may have a protective effect on fall risk.

9 Medicines and Medication Review

Table 9.1: Medicines classes and relationship to fall risk

Psychotropic Medicines	
Centrally acting or psychotropic medicines	Centrally acting or psychotropic medicines are likely to contribute to falls and are associated with an increased risk of a fracture from a fall.[154-156] There is an increased risk of falling while taking these medicines, compared with not taking them, of between 25% and 90%.[153]
Benzodiazepines	Benzodiazepines are strongly associated with falls.[153,157] Older people using other medicines, particularly antidepressants, are more likely to start using benzodiazepines.[158]
Antidepressants	Antidepressants are associated with higher fall risk,[153,157] in particular selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs).[153,157] There is also a significant association between fragility fractures (fractures occurring due to minimal trauma, e.g. falling from a bed or chair) and the use of SSRIs, serotonin and noradrenaline reuptake inhibitors (SNRIs).[159]
Antipsychotic	Antipsychotic use is associated with an increased risk of falls.[153] Despite fewer extrapyramidal side effects, fall risk is still associated with the atypical antipsychotic agents (risperidone and olanzapine).
Cardiovascular Medicines	
Type 1A anti-arrhythmic medicines and digoxin	Type 1A anti-arrhythmic medicines and digoxin have been identified among the anti-arrhythmic class to increase fall risk.[151] However, the effect size for falls is likely to be modest, given the inconsistencies in the association of medicines with falls.[151]
Beta-blocking agents	Beta-blocking agents demonstrate mixed results in regard to fall risk, including the potential for a protective effect on fall risk as well as an increase in fall risk.[151]
Loop diuretics	Loop diuretics are significantly associated with an increased risk of falls, likely due to their rapid diuretic effect compared to other diuretics.[151]
Antihypertensive medicines	Antihypertensive medicines have been associated with an increased risk of serious fall injuries, particularly in those people with previous injurious falls.[160] Thiazides have been found to increase fall risk, particularly in the 3 weeks following the first prescription.[161] The risk of hip fracture may also be increased with the use of antihypertensives in the first 7-45 days following prescription.[162, 163]

9 Medicines and Medication Review

Other Medicines	
Opioid	Opioid use is associated with an increased risk of falls as well as fall injuries and fractures among older people.[152,164] Side effects of opioids, such as sedation, dizziness and cognitive impairment, may account for this association.
Anticonvulsant medicines	Anticonvulsant medicines are associated with an increased risk of falls.[152]
Anticholinergic medicines	There is conflicting evidence for the risk of falls and anticholinergic medicines.[165-167]
Nonsteroidal anti-inflammatory drug (NSAID)	Adverse effects of certain non-steroidal anti-inflammatory drugs (NSAIDs) include confusion, dizziness or light-headedness, drowsiness and vision impairments. The evidence for increased risk of falls in NSAID users is inconsistent, and studies remain limited. The most recent and comprehensive systematic review found that NSAID use did not increase fall risk in an adjusted analysis.[152]
Rivastigmine	Preliminary evidence from a phase 2 trial indicates that the acetylcholinesterase inhibitor rivastigmine can improve gait stability and might reduce the frequency of falls for older people with Parkinson's Disease.[168]
Other	Other types of cardiac medicines, antacid medicines[169] and analgesic agents[152] are not consistently associated with an increased risk of falls.

Polypharmacy

Polypharmacy is the use of multiple medicines to prevent or treat medical conditions. It is commonly defined as the concurrent use of five or more medicines by the same person.[170] Medicines include prescription, complementary and non-prescription medicines.

Taking more than one medicine has been associated with an increased risk of falls and an increased risk of fall-related fractures in older people.[142,143, 153,171] This may be the result of adverse reactions to one or more of the medicines, detrimental medicine interactions, or incorrect use of some or all of the medicines.

The relative risk of falling for older people using only one medicine (compared with older people not taking any medicine) can be as high as 1.4, increasing to 2.2 for older people using two medicines and 2.4 for older people using three or more medicines.[143]

The use of multiple medicines may be partly a proxy measure for poor health in an older person.[159]

9.1.2 Behaviour support plans

In Australia, residential aged care service (RACS) providers are required to have a behaviour support plan in place for older people in the RACS who require or may require the use of restrictive practices as part of their care.[123] A behaviour support plan may include medicine prescribed as a chemical restraint.

If an older person from a RACS who has a behaviour support plan in place is admitted to hospital, health professionals at the hospital should use the behaviour support plan to inform the individual care plan for the older person while in hospital. If a chemical restraint is used, a medicines review in consideration of the behaviour support plan will help the hospital manage the older person's care safely and effectively.[123]

9 Medicines and Medication Review

9.1.3 Evidence for interventions

A medicines review should be a core part of the assessment of an older person while in the hospital. It should be completed on admission or as soon as possible.

Medicines reviews have been shown to significantly reduce the risk of falls when part of multifactorial fall prevention intervention for older people in hospital.[124, 172]

Management of insomnia

The prescription of benzodiazepines, z-drugs or other psychotropic medicines for the management of insomnia in older persons should be avoided unless there is a clear pattern of addiction or inability to complete a withdrawal program. Non-pharmacological approaches to the management of insomnia should also be considered.

9.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and developing an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

9.2.1 Reviewing medicines

The appropriateness of medicines should be reviewed routinely in all hospitalised older people. Each hospital should take a proactive organisational approach to medicines review, which should include:

- reviewing the older person's medicines on admission to and discharge from hospital [173]
- taking into consideration the older person's behaviour support plan, if relevant
- reviewing medicines charts regularly during the older person's hospital stay as medical conditions can change quickly in the hospital setting.[144]

Refer to the Medication Safety Standard in the National Safety and Quality Health Service (NSQHS) Standards for further information.

9.2.2 Providing in-hospital interventions

The following strategies help to ensure the quality use of medicines. They are good practice for preventing falls and harm from falls in older people in the hospital setting:

- Prescribe the lowest effective dosage of medicines specific to the symptoms.
- Provide support and reassurance to older people who are gradually stopping the use of psychoactive medicine(s).
- If the older person needs to take medicines known to be implicated in increasing the risk of falls, try to minimise the adverse effects, including drowsiness, dizziness, confusion and gait disturbance.
- Provide the older person and their carers with an explanation of newly prescribed medicines or changes to prescriptions.
- If the older person has a behaviour support plan, ensure the multidisciplinary team is aware of it, and the behaviour support plan informs the older person's hospital care plan.
- Avoid initiating psychoactive medicines in older people while they are in the hospital. Alternative approaches, such as behavioural and psychosocial treatments, to manage sleep disorders, anxiety and depression should be tried before pharmacological treatment. This may avoid the longer-term problems associated with side effects and difficulties with withdrawal from the medicines.
- Educate the entire multidisciplinary team, as well as older people and their carers, to improve their awareness of medicines associated with an increased risk of falls.
- Document information in the older person's patient file when implementing, evaluating, intervening in, reviewing, educating and making recommendations about the older person's medicines use.

9.2.3 Providing post-hospital interventions

Given that changes are often made to an older person's medicines during a hospital stay, it is important to ensure that all changes made are conveyed to the primary care prescriber.

Home Medicines Review

A home medicines review (HMR) involves a credentialed pharmacist conducting a medicines review in the older person's home to help them better understand and manage their medicines. An HMR results in a report from the pharmacist to the older person's general practitioner (GP), and a medicine management plan is agreed upon between the GP and the older person and their carers.

An HMR is particularly beneficial when substantial changes have been made to the older person's medicines, complex regimes have been prescribed or where there are concerns about adherence following discharge.

Hospitals can initiate a post-hospital medicines review. There is evidence that GP-initiated post-hospital HMR does not occur in a timely way, if at all. Hospital-based medical specialists (assisted by hospital pharmacists) can directly refer patients to undertake a timely post-hospital medicines review.[174] For more information, see the Home Medicines Review Program.

Multifactorial fall risk prevention program after hospital discharge

The following interventions can be used as part of a multifactorial fall risk prevention program after hospital discharge:

- Withdraw psychoactive medicine gradually and under supervision to prevent falls significantly.[175] The NPS MedicineWise has guidelines on withdrawing benzodiazepines.
- Limit multiple medicines use to reduce side effects and interactions and the tendency towards the proliferation of medicines use.[124]
- If centrally acting medicines such as benzodiazepines are prescribed, increase surveillance and support mechanisms for older people during the first few weeks of taking these medicines because the risk of falling is greatest during this period.[176]
- Medicines that act on the central nervous system, especially psychoactive medicines, are associated with an increased risk of falls; therefore, they should be used with caution and only after weighing up their risks and benefits.[35]

Case study

Ms C is a 90-year-old woman who was admitted to hospital after falling at home and fracturing her hip. During admission, hospital staff reviewed Ms C's medicines and noticed that she had been taking benzodiazepine for many years.

After a discussion with Ms C, the multidisciplinary team agreed that a withdrawal program be instituted. By the time Ms C had undergone a period of inpatient rehabilitation, she had managed to successfully stop her benzodiazepine. Because of her recent hip fracture, she was also started on calcium, vitamin D and a bisphosphonate while in the hospital.

The cessation of the benzodiazepine was communicated to Ms C's general practitioner upon Ms C's discharge from the hospital.

9.3 Special considerations for cognitive impairment

People with cognitive impairment may have difficulties taking medicine, and some older people will require medicine supervision. Dose administration aids (such as blister packs or sachets) or other devices or supports, such as electronic reminders or alarms, can be used as an aid. Prescribers should aim to keep medicine regimens simple and, where possible, keep the frequency of medicines intake to a maximum of daily or twice daily.

When there is concern about cognition and the ability of an older person to take medicines after discharge from hospital, the multidisciplinary team should consider a trial of self-medicine, including trialling a blister pack while the older person is in hospital, to identify potential problems.

Possible communication difficulties experienced by older people with cognitive impairment can make subjective assessments of an older person's ability to manage their medicines regime unreliable. Special attention needs to be given to altered behaviours and nonverbal cues in this population.

Dementia medicines

There is evidence that dementia medicines, cholinesterase inhibitors and memantine do not significantly increase the risk of falls in cognitively impaired older people. However, cholinesterase inhibitors may increase the risk of syncope.[177]

Additional information

The relevant professional practice standards and guidelines govern physician and pharmacist roles in assessment and evaluation procedures:

Useful resources for staff

- National Medicines Policy
- National Strategy for Quality Use of Medicines
- Quality Use of Medicines
- Standards of Practice for Clinical Pharmacy published by Advanced Pharmacy Australia
- Australian Pharmaceutical Formulary and Handbook, 24th edition, Pharmaceutical Society of Australia (2018) – guidelines and practice standards for medicine management review
- MIMS medicines database – includes full and abbreviated information and over-the-counter information
- Home Medicines Review – Pharmacy Programs Administrator
- Pharmaceutical Society of Australia (PSA)
- Advanced Pharmacy Australia
- Psychotropic Medicines in Cognitive Disability or Impairment Clinical Care Standard (2024)
- Position paper on polypharmacy and fall-risk-increasing drugs[178]
- Principles of safe and high-quality transitions of care
- NPS MedicineWise *Focus on anticholinergic burden*

10 Continence

10.1 Background and evidence

Incontinence affects many older people in hospital, with the risk factors for urinary incontinence being multifactorial.[179] About two-thirds of older people in geriatric wards have urinary incontinence.[180]

Episodes of incontinence are often transitory and may be related to acute illness. Transient incontinence is present in 50% of older people in hospital.[181]

While urinary and faecal incontinence affect both males and females, it is not usually considered to be part of the normal ageing process. However, age-related changes within the urinary tract do predispose older people towards urinary incontinence.[182]

Managing incontinence appropriately has been shown to improve urinary incontinence symptoms in older people and may improve overall care.[183] Managing incontinence as part of an older person's multifactorial fall prevention intervention can reduce the risk of falls and harm from falls.[33, 184, 185]

10.1.1 Incontinence associated with increased fall risk

The relationship between incontinence and falls is not straightforward[180] and is likely to be confounded by impairment of mobility and cognition.[186]

In the hospital setting, urinary and faecal incontinence, urinary frequency, assisted toileting and nocturia (urge to urinate at night) are associated with an increased risk of falls and fall-related fractures.[96, 98, 187, 188] Nocturia on its own is associated with an approximately 1.2-fold increased risk of falls and a 1.3-fold increased risk of fall-related fractures.[189]

Older people are often reluctant or embarrassed to discuss issues around continence. Older people may make extraordinary efforts to avoid an incontinent episode, including placing themselves at increased risk of falling.[190]

Bladder and bowel symptoms as fall risk factors

Different types and presentations of bladder and bowel symptoms are associated with an increased risk of falling and harm from falling. These are explained in Table 10.1.

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Table 10.1: Bladder and bowel symptoms and their relationship to fall risk

Bladder symptoms
Nocturia
Nocturia is defined as being woken at night by the desire to void.[191] Nocturia is common and is significantly associated with an increased risk of falls and fall-related fractures among older people.[189]
Nocturia is one of the most common causes of poor sleep and can be particularly problematic when lighting is poor or when the older person is not fully awake.[192]
Urge (urinary) incontinence
Urge (urinary) incontinence is defined as involuntary urine leakage accompanied or immediately preceded by urgency.[191]
Urinary incontinence is associated with an increased risk of falls and fractures.[193] A larger volume of urine lost through incontinence is also associated with a greater risk of falls.[194]
Regardless of continence status, the walking speed and stride width of older women are reduced when they experience a strong desire to void.[190] The need to concentrate on getting to the toilet whilst walking, akin to dual-tasking, is a contributing mechanism to fall risk.
Lower Urinary Tract symptoms
Lower Urinary Tract symptoms refer to a group of clinical symptoms involving the bladder, urinary sphincter, urethra and, in men, the prostate.
Poorer functional mobility has been related to lower urinary tract symptoms in older women, thereby increasing their fall risk.[195]
Bowel symptoms
Constipation
Constipation may cause delirium and agitation, which may, in turn, predispose an older person to falling.
Constipation is a common problem in older people and is related to decreased mobility, reduced fluid intake and the use of several high-risk medicines.
Straining during defecation may also shunt blood away from the cerebral circulation, leading to dizziness or syncope (temporary loss of consciousness) due to the vasovagal phenomenon.[196] Relieving constipation improves lower urinary tract symptoms, including urinary incontinence.[197]
Diarrhoea
Diarrhoea may cause agitation as well as metabolic disturbance, which may, in turn, predispose an older person to falling.

10 Continence

Incontinence fall risk factors in hospitals

While numerous falls in hospitals occur when going to or returning from the toilet, the strong associations reported between incontinence, dementia, depression, falls and level of mobility suggest shared risk factors rather than causal connections.[198]

Urinary and faecal incontinence can predispose an older person to falls in several ways:

- An incontinence episode increases the risk of a slip on the soiled or wet floor surface.[33]
- Urinary incontinence is a significant risk factor for falls in older people who cannot stand unaided.[199]
- Those older people who need to use an assistive device for walking and are incontinent at night are at higher risk of falling, particularly in the early hours of the morning.[200]
- Urinary tract infections can cause delirium, drowsiness, hypotension, pain and urinary frequency.
- Medicines used to treat incontinence, such as anticholinergics or alpha-blockers, can cause postural hypotension and falls; anticholinergics can cause acute confusion and constipation.
- Medicines such as diuretics, used predominantly to manage heart failure, can potentially increase the risk of falls through increased urinary frequency or hypovolaemia (low blood volume).
- Nocturia, combined with poor vision and balance, increases the likelihood of falls at night.

10.1.2 Incontinence and fall prevention in hospitals

There is limited evidence that continence care directly prevents falls in older people. However, when included as part of an older person's multifactorial fall prevention approach, managing incontinence can reduce the risk of falls and harm from falls, as discussed below.[33, 184, 185]

Pelvic floor muscle training

The most recommended and most effective intervention for women with stress incontinence is pelvic floor muscle training.[201] Men can also benefit from pelvic floor muscle training. A continence adviser, gynaecologist, or physiotherapist can assist older people in treating mixed and urge incontinence, as well as managing overactive bladder symptoms.

Toileting-assistance programs

Toileting-assistance programs and regular toileting regimes are an important and practical approach to maintaining continence for many older people in hospital and can reduce the risk of falls.[202-204] The three types of toileting assistance programs – timed voiding, habit retraining and prompted voiding – are outlined in Section 10.2.2.

Continence management

A pelvic floor muscle training program combined with a balance and mobility exercise training program was effective at improving urinary incontinence symptoms as well as balance and gait in older women with urge urinary incontinence.[205]

Other examples of in-hospital fall prevention programs that incorporate strategies to promote continence as part of multifactorial intervention programs include:

- Toileting protocols and practices were effective in an aged care hospital setting. [72]
- Older people in an acute hospital setting who were toileted regularly had fewer falls than older people who were not toileted regularly.[206]
- Assessment and management of urinary tract problems were included as part of a successful intervention for preventing falls by in-patients.[124]
- Low-intensity exercise combined with an active toileting-management plan improved functional outcomes and urinary and faecal continence for older people in aged care.[85]

10 Continence

10.2 Principles of care

Older people are often reluctant or embarrassed to discuss issues around continence. Health professionals and hospital staff should enquire openly and routinely about incontinence symptoms rather than rely on the older person to mention it during a consultation.

When discussing incontinence, it is important to be aware that Aboriginal or Torres Strait Islander men and women will generally only discuss this matter with a health worker of the same sex as the patient.[207]

Continence care involves intimate personal care and treatment. At all times, continence care should be person-centred and respect the personal privacy, dignity and comfort of the person.

Person-centred care involves partnering with the older person to understand their needs, goals, and preferences, and developing an individualised care plan that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

10.2.1 Screening and assessing continence

Symptoms of incontinence

Symptoms of incontinence can be assessed in the hospital setting using validated assessment tools.[187] Two validated fall risk assessment tools that include questions about bladder and bowel control are the:

- St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY) identifies continence status by asking, 'Are there any alterations in urination – frequency, urgency, incontinence, nocturia?'[188]
- The Peter James Centre Fall Risk Assessment Tool (PJC-FRAT) identifies continence status by asking whether the older person requires especially frequent toileting, both day and night.[68]

Cause of incontinence

The cause of an older person's incontinence should be established through a thorough assessment.

Older people may have more than one type of incontinence, which can make assessment findings difficult to interpret.[208] The following strategies can be used to assess and interpret the older person's continence status:

- **Obtain a continence history** of the older person, which may include a bladder chart (a frequency/ volume chart) or a continence diary. Continence history should be recorded for a minimum of two days to provide a valid assessment.[209]
- **Use simple, validated questions** with the older person to help differentiate the type of urinary incontinence they have.[210]
- **A bowel assessment** may be required to determine the older person's normal bowel habits and any significant change because constipation can affect bladder function.
- **Diagnostic physical investigations** may be suitable and should be considered on an individual basis. Consent must be obtained from the older person before the physical examination, which should be done by a suitably qualified health professional.
- **Post-void residuals** should be checked in older people with incontinence.[211]
- **Functional considerations**, such as reduced dexterity or mobility of the older person, can affect toileting and should be assessed and addressed.
- **A toilet assessment** should consider accessibility, especially if the older person uses a walking aid, as well as proximity height and the need for a handrail (see Chapter 16).
- **Assessment of fall risk factors** related to incontinence needs to be considered along with the symptoms and signs of bladder and bowel dysfunction.

10.2.2 Strategies to promote continence

Appropriate management of incontinence may improve the overall care and wellbeing of an older person in hospital.

The suggested strategies below are adapted from those recommended by the 6th International Consultation on Incontinence 2018[212] and should be used to promote continence in the hospital setting:

- Ensure the older person has access to a comprehensive and individualised continence assessment that identifies and treats reversible causes, including constipation and medicines side effects.
- Use an adequate trial of conservative therapy (lifestyle factors) as the first line of management.
- Establish treatment strategies as soon as incontinence has been diagnosed. The aim of managing urinary incontinence is to alter those factors causing incontinence and to improve the continence status of the older person. Management of incontinence is a multidisciplinary task that ideally involves all suitably qualified health professionals and care staff in the hospital.
- Address all comorbidities that can be modified.
- Make sure toileting protocols and practices are in place for older people at risk of falling.
- Offer toileting assistance during frequent nursing rounds (every one to two hours).
- Encourage habit training, prompted voiding or timed voiding programs to help improve the older person's control over their toileting regime and reduce the likelihood of incontinence episodes:
  - ☐ Habit retraining is based on identifying a pattern of voiding and tailoring the toileting schedule to the older person.
  - ☐ Prompted voiding aims to increase continence by increasing the older person's ability to assess their continence status and respond appropriately.
  - ☐ Timed voiding is characterised by a fixed schedule of toileting.
- Reducing an older person's caffeine and carbonated drinks intake may help decrease symptoms of urgency and frequency.
- Minimise environmental risk factors by:
  - ☐ keeping the pathway to the toilet obstacle free and leaving a light on in the toilet at night
  - ☐ ensuring the older person is wearing suitable clothes that can be easily removed or undone
  - ☐ recommending appropriate footwear to reduce the risk of slipping in urine
  - ☐ using a nonslip mat on the floor beside the bed for older people who experience incontinence on rising from the bed, particularly if on a non-carpeted floor in the bedroom (care must be taken when using mats to ensure the older person does not trip on the mat)
  - ☐ checking the height of the toilet and the need for rails to help the older person when sitting and standing from the toilet (reduced range of motion in hip joints, which is common after total hip replacement or surgery for fractured neck of femur, might mean the height of the toilet seat should be raised).
- Where possible, consult a continence adviser if the usual continence management methods described above are not effective or if the older person is interested in learning simple exercises to improve their bladder or bowel control.
- Some men are resistant to the idea of doing pelvic floor exercises. This should be recognised and the benefits explained.
- Consider using continence aids as a trial management strategy.

Case study

Ms U is an 85-year-old woman who was admitted to hospital after falling and breaking her arm. When the nurse asked why she fell, Ms U said she was rushing to the toilet.

A urinalysis done by the nurse showed leucocytes and nitrites. The sample was sent for culture and sensitivity. Ms U had a confirmed urinary tract infection, which was then treated with a short course of antibiotics.

Ms U's urinary frequency and urgency settled with the treatment. Having sustained a minimal trauma fracture, she was referred on discharge for a bone mineral density scan and formal assessment of bone health.

10.3 Special considerations for cognitive impairment

Both urinary and gastrointestinal problems can cause acute delirium. Cognitive impairment and dementia can also lead to problems with both urinary and faecal continence.

Regular, proactive toileting is recommended for older people in hospital with cognitive impairment. Aim to identify each older person's specific toileting times and prompt them to go around those times. Older people with cognitive impairment may benefit from prompted voiding,[202] scheduled toileting and attention to behaviour signals indicating the desire to void.

Older people with severe dementia may need to be reminded of the location of the bathroom.

11 Feet and footwear

11.1 Background and evidence

Foot problems are a contributing factor to mobility impairment. They are directly associated with an increased risk of falling and fractures in older people.

Inappropriate footwear is also a contributing factor to falls and fractures in older people and is a significant issue in hospital settings.[213] One study found that 72% of older people admitted to a hospital rehabilitation ward wore ill-fitting footwear.[214]

Many older people wearing inappropriate footwear believe the footwear to be adequate. However, about 75% of older people who have suffered a fall-related hip fracture in the community were wearing footwear with at least one suboptimal feature at the time of the fall.[215]

Feet and footwear assessment, ideally during admission, is a common and effective fall prevention strategy used in hospitals.

Multifactorial fall prevention interventions that incorporate appropriately fitted and safe shoes or footwear for the older person result in a demonstrable reduction in falls.[215]

Footwear associated with increased fall risk

Footwear can increase the risk of falls in different settings for a range of reasons:

- Poorly fitting footwear or footwear inappropriate for the environmental conditions impairs foot position sense.[216]
- Wearing shoes with inadequate fixation (i.e., shoes without laces, buckles or Velcro fastening) is associated with an increased risk of tripping.[215]
- Wearing high-heeled shoes impairs balance compared with low-heeled shoes or being barefoot.[217, 218]
- Medium- or high-heeled shoes and those with a narrow heel significantly increase the likelihood of sustaining all types of fractures.[219]
- Slip-on shoes and sandals increase the risk of foot fractures because of a fall.[219]
- Slippers are often the indoor footwear of choice for many older people, but they are associated with an increased risk of injurious falls.[220]
- Walking barefoot or in socks is associated with a 10–13-fold increased risk of falling.[219]

11.1.1 Appropriate footwear to reduce fall risk

Appropriate footwear can improve the mobility, balance and gait of an older person and reduce the risk of falling.

Table 11.1 outlines the shoe characteristics recommended for older people to prevent falls and associated harm.[221]

Table 11.1: Characteristics of best footwear for preventing falls

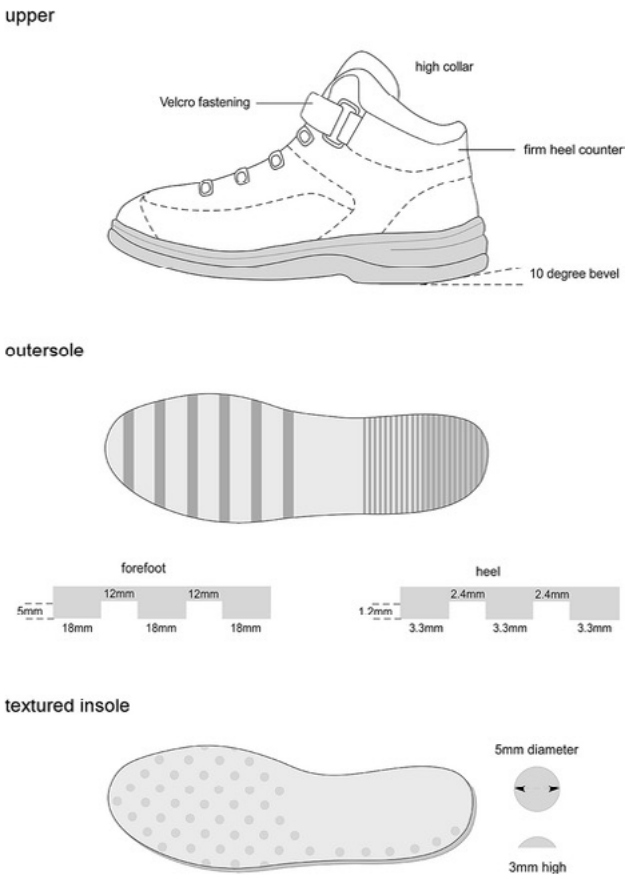
Characteristic	Rationale
Soles	Thinner, firmer soles appear to improve foot position sense A tread sole may further prevent slips on slippery surfaces
Heels	A low, square heel improves stability
Collar	Shoes with a supporting collar improve balance

Theoretical 'safe' shoe

Figure 11.1 depicts a theoretical 'safe' shoe to optimise balance in older people. Feedback from older people using the 'safe' shoe has focused on improving the aesthetics and comfort of the 'safe' shoe, with further testing to be done to assess the possible relationship between the 'safe' shoe and an older person's fall risk.

11 Feet and footwear

Figure 11.1: The theoretical optimal 'safe' shoe: Menz [222]



11.1.2 Foot problems and increased fall risk

Foot problems are well recognised as a contributing factor to mobility impairment in older people, with fall risk increasing as the number of foot problems increases.[223] Women report a higher prevalence of foot problems than men, which might be influenced by fashion footwear.[224] The most commonly reported foot problems are:[225-227]

- pain from corns, calluses and bunions
- foot deformities, such as hallux valgus, hammer toes and nail conditions.

Key points on foot problems in older people include:

- Older people with foot pain walk more slowly and have more difficulty performing daily tasks than those people without pain.[228]
- The presence of foot problems, such as pain, toe deformities, toe muscle weakness and reduced ankle flexibility, can alter the pressure distribution beneath the feet, impairing balance and functional ability.[227, 229-231] Podiatry may help manage these conditions.[232-234]
- Ageing is associated with reduced peripheral sensation, with older people who experience falls performing worse in tests of lower limb proprioception,[235] vibration sense [236] and tactile sensitivity.[235]
- Reduced plantar tactile sensitivity, particularly in older people with diabetes,[235] may be a risk factor for falls[227] because it might influence the person's ability to maintain postural control when walking, particularly on irregular surfaces.[231, 235]
- People with diabetic neuropathy have impaired standing stability[237, 238] and are at increased risk for falls and fractures. [238]
- Cancer survivors with chemotherapy-induced peripheral neuropathy report impaired foot sensation, which in turn impairs their balance and stepping and increases their risk of falls.[239] There is growing evidence that exercise is an effective strategy for reducing symptoms and improving balance and mobility in this clinical group.[240]

11 Feet and footwear

11.1.3 Podiatry interventions to improve function and reduce falls

Multifactorial fall prevention interventions that focus on feet and footwear have been effective in reducing falls among older people.

Multifaceted podiatry interventions – including foot orthoses, advice, and provision of new footwear if required, targeted foot and ankle exercises, fall prevention education, and an instructional leaflet – are effective in reducing falls and fractures in older people with disabling foot pain.[241-243] Contributing factors likely include improvements in foot and ankle strength, range of motion, balance and functional ability.

Multifactorial interventions involving referral to podiatry as a fall prevention strategy have resulted in a significant reduction in fall rates in older people.[244]

Footwear interventions, including shoe insoles and foot orthoses, can facilitate meaningful improvements in balance and gait in older people through a combination of mechanical and sensorimotor mechanisms, which may translate to the prevention of falls.[245] Textured and vibration insoles have the greatest effects.[246]

11.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences to develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

11.2.1 Assessing feet and footwear

Hospital staff should arrange for the older person's feet and footwear to be assessed as part of pre-admission screening or upon admission. This assessment should be done by a health professional skilled in assessing feet and footwear.[247, 248] A registered nurse may identify the need for a referral to a podiatrist if the older person's feet and footwear are of particular concern.

The following components of feet and footwear assessment for older people are most relevant to the hospital setting.

Assessment of footwear

A safe shoe checklist is a reliable tool for evaluating specific shoe features that could potentially improve postural stability in older people.[249]

Assessment of foot problems

An older person should be assessed for foot pain and other foot problems regularly.

Refer the older person to a podiatrist or other health professional skilled in the assessment of feet and footwear if any of the following conditions or clinical signs are evident in assessing the older person's feet:

- foot pain
- foot problems, such as swelling, arthritis, corns, calluses, bunions, toe deformities, skin and nail problems or other foot abnormalities, such as collapsed arches or a high-arched foot
- conditions affecting balance, posture or proprioception in the lower limbs, such as diabetes, peripheral neuropathy or peripheral vascular disease
- unsteady or abnormal gait
- inappropriate or ill-fitting footwear, or a requirement for foot orthoses.[250, 251]

Suspected distal sensory loss

If a foot assessment identifies suspected distal sensory loss in an older person, they should be referred to a medical practitioner to look for potentially reversible or modifiable causes of neuropathy.

Some of the more common causes of peripheral neuropathy include diabetes, vitamin B-12 deficiency, peripheral vascular disease, alcohol misuse and adverse effects of some medicines.[252, 253]

For tactile sensory loss, 4.31 monofilament is the best filament for detecting the risk of falls in older people.[252]

A podiatrist assessment

A detailed assessment by a podiatrist for a fall-specific feet and footwear examination should include: [248, 250,251]

- **medical and fall history:** including foot pain and footwear use
- **dermatological assessment:** skin and nail problems, and infection status
- **vascular assessment:** peripheral vascular status
- **neurological assessment:** proprioception; balance and stability; sensory, motor and autonomic function
- **biomechanical assessment:** posture, foot and lower limb joint range of motion testing, evaluation of foot deformity including hallux valgus, and gait analysis
- **footwear assessment:** stability and balance features; prescription of footwear, footwear modifications, or foot orthoses based on the assessment of gait while wearing shoes
- **education:** to reinforce the link between poor footwear and foot problems and fall risk.

11.2.2 Strategies for improving foot condition and footwear

All healthcare professionals can play an important role in identifying ill-fitting or inappropriate footwear and in screening older people for foot pain or foot problems. Other strategies to improve an older person's foot condition and footwear include:

- educating older people and their carers and family (to the extent the older person chooses) about basic foot care and providing information about footwear
- ensuring shoes are repaired when indicated
- recognising that older people who have a shuffling gait (e.g. due to Parkinson's disease) may be at higher risk of falling if they wear nonslip shoes on certain carpeted floors[254]
- ensuring that older people with urinary incontinence have dry, clean footwear
- ensuring older people have more than one pair of shoes in case their shoes become soiled or damaged
- discouraging walking while wearing slippery socks and stockings
- discouraging the use of talcum powder in the hospital, which may make floors slippery
- referring the older person to a podiatrist for orthotics in cases of significantly deformed feet
- referring older people to a podiatrist for further assessment and management.

Case study

Mr R is 74 years old and in hospital for the management of his diabetes. He has a recent history of falls. As part of a multifactorial fall prevention program, nursing staff ran a basic foot screening and found that Mr R had poor sensation and some calluses and lesions on his feet. As a result of the assessment findings, the nursing staff organised a podiatry assessment.

The podiatrist found that Mr R had mild peripheral neuropathy and was unsteady on his feet because he wore oversized sports shoes with a thick, cushioned sole to 'help' his calluses. The podiatrist treated his lesions and referred him to a community podiatry service on discharge. The podiatrist also taught Mr R how to buy better-fitting footwear that will improve his stability while still being safe for his neuropathic feet. Mr R found that his balance improved after he bought more appropriate footwear.

11.3 Special considerations for cognitive impairment

Older people with cognitive impairment may not report discomfort reliably. Therefore, when checking older people's footwear, hospital staff should also check the older person's feet for lesions, deformities and pressure areas. Footwear and foot care issues should also be discussed in detail with the older person's carers and family (to the extent the older person chooses).

11 Feet and footwear

Additional information

- Stay On Your Feet Program fall prevention resources, Queensland Government
- The Looking After Feet Project provides culturally appropriate resources developed for Aboriginal and Torres Strait Islander peoples as part of the Aboriginal and Torres Strait Islander Diabetes-Related Foot Complications Program
- The Australasian Podiatry Association provides details of practitioners visiting rural and remote areas in each state and territory.
- Resources that may assist rural and remote practitioners have been developed by Services for Australian Rural and Remote Allied Health (SARRAH).

12 Syncope

12.1 Background and evidence

Syncope is defined as a transient and self-limiting brief loss of consciousness. It is commonly described as fainting or passing out. Presyncope describes the sensation of feeling faint or dizzy and can precede an episode of loss of consciousness.

While several conditions can present with syncope, all share the final common pathway of cerebral hypoperfusion, leading to an alteration in consciousness. Older people are more predisposed to syncopal events due to age-related physiological changes that affect their ability to adapt to changes in cerebral perfusion.

The incidence of syncope in older people living in the community has been reported as 6.2 per 1,000 person-years.[255] Some of the more common causes of syncope in older people include vasovagal syncope, orthostatic hypotension, carotid sinus hypersensitivity, cardiac arrhythmias, aortic stenosis and transient ischaemic events. Epilepsy may present as a syncopal-like event. Less common causes of syncope include micturition, defecation, cough and postprandial syncope.

Self-reported cardiovascular symptoms, including angina, heart failure, heart murmur, arrhythmia and myocardial infarction, are associated with syncope and a history of multiple falls in community-dwelling older people.[256]

The main types of syncope are outlined below.

12.1.1 Vasovagal syncope

Vasovagal syncope (usually described as fainting) is the most common cause of syncope. It has been reported to be the cause of up to 66% of syncopal episodes presenting to an emergency department. [255]

Vasovagal syncope is often preceded by pallor, sweatiness, dizziness and abdominal discomfort, although these features are not always seen in the older person. [255] Commonly reported precipitants of vasovagal syncope include prolonged standing (particularly in hot or confined conditions), fasting, dehydration, fatigue, drinking alcohol, acute febrile illnesses, pain, venipuncture and hyperventilation.

The diagnosis of vasovagal syncope is usually made clinically, although formal assessment with non-invasive cardiac monitoring and prolonged tilting is possible.

Treatment is largely non-pharmacological and is targeted at avoiding the cause. This may include avoiding prolonged standing in hot weather and ensuring that the older person drinks enough to maintain hydration.

It is important to reassure older people that vasovagal syncope is a benign condition.

12.2.2 Orthostatic hypotension (postural hypotension)

Orthostatic hypotension (also called postural hypotension) refers to a drop in blood pressure on standing from either the sitting or lying position. The drop in blood pressure can be enough to cause symptoms of dizziness or precipitate a syncopal event.[257]

A formal diagnosis of orthostatic hypotension is made by recording a drop in systolic blood pressure of at least 20 mm Hg or a drop in diastolic blood pressure of at least 10 mm Hg within three minutes of standing. The person should lie still for at least five minutes before taking the initial lying blood pressure measurement.

Causes of orthostatic hypotension

Medicines and volume depletion are the two most common causes of orthostatic hypotension in older people. Medicines commonly associated with orthostatic hypotension include antihypertensive agents, antianginals, antidepressants, antipsychotics and antiparkinsonian medicines and diuretics. Diuretics can have a direct effect on blood pressure and can also cause volume depletion, which can cause orthostatic hypotension.

Certain diseases (such as Parkinson's disease, stroke and diabetes) can also have a direct impact on autonomic function and interfere with blood pressure regulation. Prolonged periods of immobility can disrupt postural control of blood pressure.

Treatment for orthostatic hypotension

Treatment of orthostatic hypotension involves identifying the precipitating cause and modifying medicines, where possible. Maintaining adequate hydration, particularly during hot weather, is important for the older person. Pharmacological intervention is needed in a small number of cases to treat orthostatic hypotension. Medicines that might be used include fludrocortisone or midodrine (an alpha-agonist).

Orthostatic hypotension and fall risk

Orthostatic hypotension is associated with an increased risk of falls and harm from falls.[258-260]

Several mechanisms have been suggested for how orthostatic hypotension can predispose older people to falling. These include:

- a direct pathway in which the decrease of postural blood pressure leads to fainting or syncope
- indirect pathways, including:
  - ☐ orthostatic hypotension impairing cognitive function
  - ☐ impairment of balance and mobility due to presyncope
  - ☐ medicines-induced increased magnitude and duration of orthostatic hypotension, often compounded by polypharmacy.[261]

12.1.3 Carotid sinus hypersensitivity

Carotid sinus hypersensitivity is an abnormal haemodynamic response to carotid sinus stimulation. When associated with symptoms, it is referred to as carotid sinus syndrome.

Carotid sinus hypersensitivity may occur when the head is rotated or turned or when pressure is placed on the carotid sinus. Triggers may include carotid massage, shaving, wearing tight collars or neckwear, or tumour compression.[262]

Three abnormal responses can be noted on direct massage of the carotid sinus:

- A cardioinhibitory response is defined as a three-second period of asystole following massage of the carotid sinus.
- A vasodepressor response is defined by a 50 mmHg drop in blood pressure in the absence of significant cardio inhibition.
- A combination of the vasodepressor and cardioinhibitory response defines the mixed form of carotid sinus hypersensitivity.

12.1.4 Cardiac arrhythmias

Abnormal heart rhythms can lead to dizziness and syncope, with atrial fibrillation independently associated with falls and syncope in older people.[263]

Sick sinus syndrome is an abnormal slowing of the heart caused by degeneration of the cardiac conducting system. Sick sinus syndrome is managed by inserting a cardiac pacemaker. Slowing of the heart rate can also be associated with certain medicines (beta-blockers and digoxin), and the treatment in these cases is to reduce or cease the prescription of these medicines.

Diagnosis of an abnormal heart rate requires a person to be monitored at the time of the abnormal heart rate and can often be challenging. Treatment depends on the nature of the abnormal rhythm.

12.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and developing an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

12.2.1 Assessing syncope

It is important to ensure that older people reporting presyncope or syncope undergo appropriate assessment and intervention, particularly if the cause is not obvious.

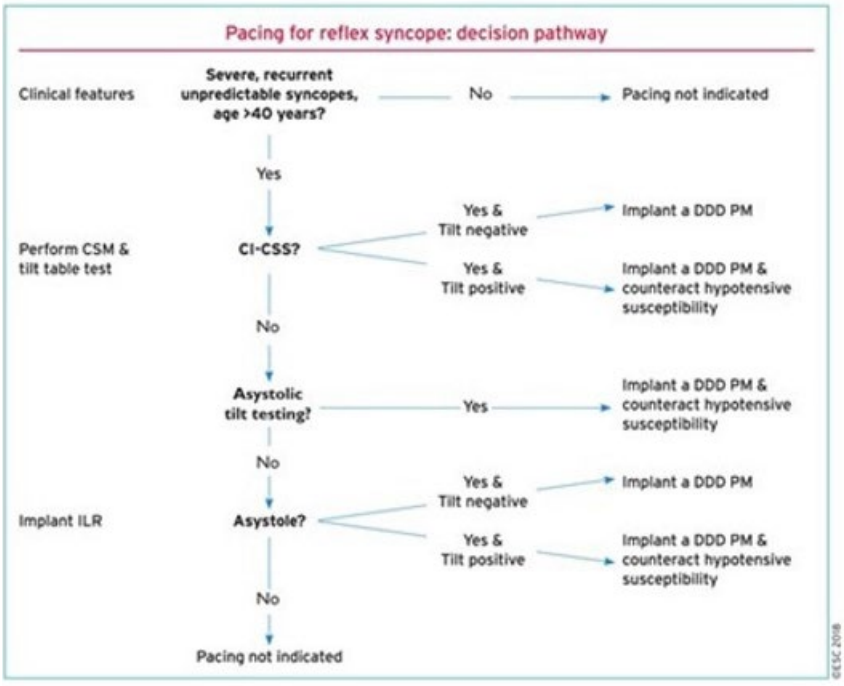
12 Syncope

The older person's symptoms should be evaluated by their general practitioner, and – depending on the history and results of the clinical examination – certain tests and investigations may be warranted.

These include an electrocardiogram (ECG), echocardiography, tilt-table testing, carotid sinus massage,[264] continuous non-invasive orthostatic blood pressure measurement[142] and insertion of an implantable loop recorder.

The European Taskforce on Syncope has produced a simple algorithm for investigating syncope.[257]

Figure 11: Descision pathway for cardiac pacing in patients with reflex syndrome. CI CSS = cardioinhibitory carotid sinus syndrome; CSM = carotid sinus massage; DDD PM = dual-chamber pacemaker; ILR = implantable loop recorder.



12.2.2 Treating syncope

Permanent cardiac pacing is successful in treating certain types of syncope. Pacemakers may reduce falls for older people with cardioinhibitory carotid sinus hypersensitivity.

Successful multifactorial fall prevention strategies for older people with syncope in the community and hospital settings have included assessments of blood pressure and orthostatic hypotension and medicines review and modification.[68, 124, 142, 144, 184, 265]

Strategies that have been suggested to reduce the symptoms of orthostatic hypotension in older people include:

- Ensure good hydration is maintained, particularly in hot weather.[266, 267]
- Encourage the older person to sit up slowly from a lying position, stand up slowly from a sitting position, and wait a short time before walking.[266, 267]
- Minimise exposure to high temperatures or other conditions that cause peripheral vasodilation, including hot baths.[267]
- Minimise periods of prolonged bed rest and immobilisation.
- Encourage older people to rest with the head of the bed raised.
- Increase salt intake in the diet if not contraindicated.
- Where possible, avoid prescribing medicines that may cause hypotension.
- Provide appropriate peripheral compression devices, such as anti-embolic stockings, if indicated.[267]
- Monitor and record postural blood pressure.

Case study

Mr L is an 82-year-old man who was brought to the emergency department with acute pulmonary oedema secondary to his ischaemic heart disease. He was admitted and given diuretics to offload the excess fluid.

During the admission, Mr L was also started on an angiotensin-converting enzyme inhibitor and beta-blocker. However, he began to report symptoms of dizziness on standing and almost blacking out on the way to the bathroom.

Mr L's lying and standing blood pressures were checked, and he was found to have significant and symptomatic postural hypotension. His medicines were reviewed, and his diuretic dose was reduced. Over the next few days, Mr L's lying and standing blood pressures were checked regularly to ensure the resolution of the postural changes, and his chest was examined to ensure that the oedema did not recur.

12.3 Special considerations for cognitive impairment

Older people with cognitive impairment may have problems recalling the events surrounding a fall. It is also important to note that older people with dementia may not present with traditional symptoms of orthostatic hypotension, such as dizziness, and instead present with mental fluctuations and confusion, drowsiness and slow falls.[268] Orthostatic hypotension should, therefore, be considered as a differential diagnosis to ensure early diagnosis and treatment.

Orthostatic hypotension is common in older people with vascular dementia. Older people with cognitive impairment and dementia may be taking medicines that are associated with orthostatic hypotension and cardiac arrhythmias, such as antihypertensives, antidepressants and antipsychotics.

Orthostatic hypotension is significantly associated with falls in older people with dementia.[118]

Additional information

- ACC/AHA/HRS versus ESC guidelines for the diagnosis and management of syncope: JACC guideline comparison. Journal of the American College of Cardiology, 74(19), 2410-2423.

13 Dizziness and vertigo

13.1 Background and evidence

Dizziness is a term used to describe a range of sensations, including:

- vertigo: a sensation of spinning
- disequilibrium: a feeling of imbalance or being unsteady
- light-headedness: a sensation of giddiness
- presyncope: a sensation of feeling faint or foggy.

Dizziness and vertigo are common presenting symptoms in hospital emergency departments[269] and are significant contributors to disability.[270] Dizziness and vertigo are observed in people of all ages but are more prevalent in those over 50 years old.[271]

Dizziness in the hospital setting remains a difficult diagnostic problem because it is a subjective sensation that may result from impairment or disease in multiple systems.[272] The most common diagnosis for dizziness is benign paroxysmal positional vertigo (BPPV).[273, 274]

When older people describe being 'dizzy', 'giddy' or 'faint', this may mean anxiety, fear of falling, postural disequilibrium, vertigo or presyncope. Therefore, it is crucial that a detailed patient history is taken at admission and reviewed regularly.

Dizziness is associated with an increased risk of falling in older people.[275, 276] Poor sensorimotor function, impaired balance control, anxiety and neck and back pain have been identified as mediators of the relationship between dizziness and falls.[277] Older people with dizziness are also at high risk of experiencing fall-related fractures.[277]

13.1.1 Vestibular disorders and fall risk

Vestibular dysfunction is the leading cause of dizziness in older people, with age-related changes in the vestibular system prevalent in people over 70 years of age.[278, 279]

The association between vestibular dysfunction and falls remains unclear[280] as there is limited research in this area in the hospital setting. Older people presenting to a hospital emergency department after a fall have a high incidence of symptoms of vestibular impairment.[281] In community-dwelling older people, vestibular dysfunction is more prevalent in fallers versus non-fallers.[282]

Asymmetrical degenerative changes in the vestibular system may contribute to fall risk by impairing balance control and providing inaccurate information to the brain about the direction and size of head or body movements.

Older people with BPPV often have balance problems. More research is needed to determine whether there is an association between older people with BPPV and their risk of falling, yet a study found that 1 in 10 older people presenting to an outpatient clinic with a range of chronic medical conditions had undiagnosed BPPV and these older people were more likely to have sustained a fall in the previous three months.[283]

13.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

13.2.1 Assessing vestibular function

An important step in minimising the risk of falls associated with dizziness is to assess an older person's vestibular function. This can be done in hospital by a suitably qualified health professional and should involve the following:

- **Ask the older person about their symptoms.** Dizziness is a general term that is used to describe a range of symptoms, including poor balance, that imply a sense of disorientation.[284] Vertigo, a subtype of dizziness, is highly characteristic of vestibular dysfunction and is generally described as a sensation of spinning.[285]

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- **Conduct a medicines review,** as many medicines have dizziness-related side effects.
- **Focus on the timing and triggers of symptoms** and use simple eye movement assessments to help diagnose and treat common peripheral vestibular disorders. Put less emphasis on the type of dizziness, patient demographics and routine use of neuroimaging.[286]
- **Consider other causes of dizziness if symptoms are not improving**, such as a migraine or Persistent Postural Perceptive Dizziness, and refer the older person onwards, where appropriate, to a neurologist or vestibular physiotherapist as indicated.

Table 13.1 outlines specific tests that can be used to assess vestibular function. These may need to be included as part of discharge planning if the relevant, suitably qualified health professionals are not associated with the hospital.

Table 13.1: Specific tests that can be used to assess vestibular function

Clinical test	Use in assessing vestibular function
Medical imaging	Use hospitalisation as an opportunity to request computed tomography (CT) or magnetic resonance imaging (MRI), as these can identify an acoustic neuroma or central pathology.[285]
Halmagyi head thrust test	The Halmagyi head thrust test assesses peripheral vestibular function.[287] The head thrust test only has good sensitivity if the vestibular dysfunction is severe or complete. [288]
Dix–Hallpike manoeuvre	Use the Dix–Hallpike manoeuvre to diagnose BPPV. BPPV should be strongly considered as part of the differential diagnosis in older people who report symptoms of dizziness or vertigo after a fall that involved some degree of head trauma. A Dix-Hallpike manoeuvre should be completed routinely for all older adults (in the absence of contraindications), given the increased prevalence of BPPV and underreporting of symptoms. In addition to the Dix-Hallpike test, patients should undergo supine roll testing to assess for horizontal canal benign paroxysmal positional vertigo (BPPV) and be treated or referred to a vestibular physiotherapist for further treatment if required. This test is included in a diagnostic protocol for evaluating dizziness in older people in general practice. It is considered mandatory in all people with dizziness and vertigo after head trauma.[289-291] Note, Dix–Hallpike testing should not be used in people with an unstable cardiac condition or a history of severe neck disease.[292] Dix-Hallpike can be modified for older people with other comorbidities.[293]
Vestibular function tests	Vestibular function tests evaluate the integrity of the peripheral (inner ear) and central vestibular structures.[294] These tests are available at some specialised audiology clinics and may be recommended if symptoms persist.[285]
Audiology testing	Audiology testing can quantify the degree of hearing loss. The auditory and vestibular systems are closely connected; therefore, auditory symptoms, such as hearing loss and tinnitus, commonly occur in conjunction with symptoms of dizziness and vertigo.[289]

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13.2.2 Assessing dizziness

There is insufficient evidence to validate the use of diagnostic tests to evaluate dizziness in the hospital setting.[295] Evidence from the primary care setting is outlined in Appendix 3.

To improve dizziness in older people, a multifactorial approach – including assessments of cardiovascular conditions and medicines use, benign paroxysmal positional vertigo, anxiety and postural sway – might assist in tailoring evidence-based therapies for the individual.[296]

Even if a diagnosis is not available, a simultaneous diagnosis- and prognosis-oriented approach for older people who experience dizziness may improve care for this group.[297] The Dizziness Handicap Inventory[296] could be used to identify if the older person is at risk of persistent impairment and then identify and treat any modifiable predictors. Table 13.2 provides some examples.

Table 13.2: Persistent impairment predictors for dizziness and their treatment options

Persistent impairment predictors	Treatment options
Impaired functional mobility	Physical exercise or physiotherapy
Comorbid anxiety	Psychotherapy and/or anxiolytics
Comorbid depression	Psychotherapy and/or antidepressants
Dizziness due to psychiatric cause	Psychotherapy and/or psychotropic medicines
Polypharmacy	Withdrawal of potentially inappropriate medicines
Avoidance of dizziness-inducing situations	Cognitive behaviour therapy.

13.2.3 Choosing interventions to reduce symptoms of dizziness

The following strategies can be used in the hospital setting to treat dizziness and balance problems caused by vestibular dysfunction. They can be used as part of a multifactorial fall prevention program to reduce the risk of falls related to dizziness.

Older people with symptoms of dizziness should be reviewed medically before any interventions are introduced or before starting a rehabilitation program.

Medical management

Vestibular neuritis

The treatment of vestibular neuritis (viral infection of inner ear structures) with methylprednisolone in the hospital emergency department within three days of acute onset has been shown to improve vestibular function at 12-month follow-up, with complete or almost complete recovery of vestibular function in 76% of the study population.[298]

Vertigo symptoms and balance

Anti-vertigo medicines combined with vestibular rehabilitation training are effective and safe. They can alleviate vertigo symptoms and improve balance in patients with vestibular neuronitis.[299]

Nausea and vomiting

In the acute hospital setting, antiemetics and vestibular suppression medicines may be required to treat the unpleasant symptoms associated with nausea and vomiting.[300] These medicines should only be used for a short duration (one to two weeks) because they adversely affect the process of central compensation following acute vestibular disease.[286, 300]

Treating BPPV

There are a range of repositioning manoeuvres, including the Brandt-Daroff exercises and Epley manoeuvre, that are effective in treating BPPV and should be performed by a suitably qualified health professional.

It is important to diagnose and treat BPPV as soon as possible because treatment improves dizziness and general wellbeing.[301] Older people with diagnosed BBPV respond as well to treatment as the general population.[302]

Vestibular rehabilitation

Vestibular rehabilitation (VR) is a multidisciplinary approach to treating stable vestibular dysfunction:

- **Physiotherapy intervention** focuses on minimising a person's complaints of dizziness and balance problems through a series of exercises tailored to each person.[301]
- **Occupational therapy intervention** involves incorporating the movements required to do these exercises into daily activities.[303]
- **Psychology input** addresses the emotional impact of vestibular dysfunction.[304]

The literature emphasises the following characteristics of VR:

- VR is safe, effective management for unilateral peripheral vestibular dysfunction.
- VR is highly successful in treating stable vestibular problems in people of all ages.[305, 306]
- Starting VR early is recommended in the hospital setting after surgical removal of an acoustic neuroma[307] and vestibular ablation surgery.[308]
- Delayed initiation of VR is a significant factor in predicting unsuccessful outcomes over time.[309]

- VR can improve measures of balance performance in older people living in the community.[310] In the hospital setting, in the first six weeks after acoustic neuroma surgery, older people receiving VR had greater improvements in balance than those who received general instructions only.[311] This may translate to a reduced risk of falling.
- Group session VR for people diagnosed with vestibular asymmetry affect the occurrence of vestibular asymmetry positively. [312]

Regular training courses in VR are held across Australia, and an increasing number of physiotherapists working in acute and subacute hospital systems are now trained to assess and manage dizziness. These physiotherapists can be found by contacting the Australian Physiotherapy Association.

Discharge planning

Discharge or post-hospital care planning is a critical part of an integrated program of care, ensuring that interventions initiated in hospital continue at home or in a residential aged care service, as necessary and possible.

Older people who are discharged from hospital may still need care and support to manage dizziness after leaving hospital. In planning for discharge:

- If the integrity of the older person's peripheral (inner ear) and central vestibular structures are of concern, refer them to a specialised audiology clinic for a vestibular function test.[294]
- Refer the older person to a specialist, such as an ear, nose and throat specialist or a neurologist, if further clinical investigations are necessary.[286]
- If the older person needs ongoing management of BPPV, arrange this on an outpatient basis.
- Encourage the older person's general practitioner to coordinate the above assessments and therapies on their behalf.

Case study

Ms T is a 75-year-old woman who was admitted to the orthopaedic ward with a Colles' fracture of her left wrist after a fall at home. Since her admission, Ms T has been reporting an intense sensation of spinning and nausea when lying flat in bed and now sleeps with the head of her bed elevated. The sensation of spinning is so severe when she lies down that Ms T has become very anxious and feels that she will be unable to manage by herself at home.

The orthopaedic physiotherapist on the ward was trained to assess and manage BPPV and identified this condition in Ms T's right inner ear using the Dix-Hallpike test. Ms T was subsequently treated with an Epley manoeuvre and felt much better within 24 hours. Repeat Dix-Hallpike testing of Ms T identified that the BPPV had resolved.

Ms T was discharged one day later and can now lie flat in bed with no symptoms of spinning. She was taught Brandt-Daroff exercises to perform at home in case the symptoms returned.

13.3 Special considerations for cognitive impairment

Alzheimer's Disease may involve impairments in the vestibular control of balance. Assessment of visual suppression may be useful in identifying older people with Alzheimer's Disease who are at risk of falling. [45]

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Additional information

- The Vestibular Disorders Association website provides resources on vestibular impairments and their treatments. https://vestibular.org/
- Physiotherapists who are trained to assess and manage dizziness can be found by contacting the Australian Physiotherapy Association. https://australian.physio/
- The Royal Australian College of General Practitioners has information on:
  - ☐ Brandt-Daroff Exercises for patients
  - ☐ Epley Manoeuvre.

14 Vision

14.1 Background and evidence

Vision loss is a common chronic condition in older people.[313] About 20% of older people aged 70 years or older have impaired vision with a visual acuity of less than 6/12.[314]

Impaired vision is an important and independent risk factor for falls and fractures in older people and is associated with increased frailty.[315,316-318] Impaired vision can refer to reduced visual acuity, depth-of-field and contrast sensitivity.

Vision plays a major role in fall risk in the hospital setting, with one study indicating that the prevalence of visual impairment, mainly cataracts and refractive errors, in hospital inpatients is high (45%).[319]

Interventions to improve vision should be part of a multidisciplinary approach to fall prevention, given that there is little evidence that single interventions are effective in preventing falls and the harm that falls cause.

14.1.1 Visual functions associated with increased fall risk

Vision is a key sensory input for maintaining balance and avoiding falls related to environmental obstacles. Older people rely disproportionately more on visual information than on proprioceptive or vestibular input for balance control.[320]

Research in the community setting has shown that:

- The risk of multiple falls increases 2.6 times if a person's visual acuity is worse than 6/7.5.[321]
- Visual acuity of 6/15 or worse almost doubles a person's risk of hip fracture, and this risk increases as visual acuity levels become worse.[322]
- Impaired visual acuity, reduced contrast sensitivity,[280, 323] poor depth perception[280324] and reduced visual field size[321,325-327] are all associated with an increased risk of falling and an increased risk of low-fragility hip fractures.[328]
- Fear of falling is more frequently reported in older people with visual deficits.[313, 329, 330]
- Many medicines are associated with visual disturbances, which may contribute to falls. Medicine side effects include blurred vision, double vision, cycloplegia (loss of accommodation), changes in colour perception, lens opacities and halo vision.[313]
- Older people who wear bifocal or multifocal prescription eyewear when walking outside and on stairs have a decreased ability to negotiate steps safely and a two-fold increased risk of falls due to tripping.[331]

14.1.2 Eye conditions associated with an increased fall risk

Several common eye conditions in older people, associated with an increased risk of falling, are outlined below, along with corresponding simulations of the visual impairments in Figure 14.1.

Cataracts

Visual changes resulting from cataracts are associated with increased postural instability[332] and fall risk and injury in older people who live in the community.[333] There is a 2- to 3-fold increased risk of falls in older people with cataracts compared to those without.[334] Older people with cataracts have been found to show a high fear of falling, particularly those with poorer physical function, more comorbidities and greater visual disability.[335]

14 Vision

Glaucoma

Older people with glaucoma can present with a range of loss of peripheral visual fields (side vision). Depending on disease severity, loss of visual fields can affect a person's postural stability[336] and their ability to detect obstacles and navigate through cluttered environments.[326, 337]

Several gait characteristics – including a broader base of support and greater variability in step length, stride length, and stride velocity – are associated with a higher risk of falling, which is also positively associated with glaucoma severity.[338]

Falls are common among older people with glaucoma and more frequent among those with greater visual impairment, particularly in the inferior field region.[339]

Macular degeneration

Macular degeneration can cause loss of central vision depending upon disease severity and is associated with impaired balance[340, 341] and an increased risk of falls and harm from falls.[341]

Diabetic retinopathy

Diabetic retinopathy can reduce visual field size and may increase the risk of falls.[315]

Figure 14.1: Visual changes compared with normal vision

Source: Courtesy of Vision 2020 Australia

Figure 14.1 Normal vision

Source: Courtesy of Vision 2020 Australia

Figure 14.2 Visual changes resulting from cataracts

Source: Courtesy of Vision 2020 Australia

Figure 14.3 Visual changes resulting from glaucoma

Source: Courtesy of Vision 2020 Australia

Figure 14.4 Visual changes resulting from macular degeneration

14 Vision

14.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

14.2.1 Screening vision

Hospitalisation provides an opportunity for systematic screening for visual problems in older people that have an impact on the older person both in the hospital setting and after discharge.

Simple vision screening methods

Two simple methods of screening vision for use in the hospital setting are:

- The St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY) considers whether the patient is visually impaired to the extent that their everyday function is affected.[340] (See Chapter 6).
- Checking an older person's ability to recognise an everyday object, such as a pen, key, or watch, from a distance of two metres.[124] Note: This test will only pick up major vision problems.

Visual function assessments

The following additional visual function assessments can also be used as good practice:

- Ask the older person about their vision and record any visual complaints and history of eye problems and eye disease.
- Check the older person's vision for signs of deterioration. This can include an inability to see detail in objects, the inability to read (including avoiding reading) or watch television, or a propensity to spill drinks or bump into objects.
- Use a standard eye chart to measure the older person's visual acuity (Snellen eye chart) or contrast sensitivity (Pelli Robson Test). See Table 14.1.
- Check the older person's vision for signs of visual field loss using a confrontation test (see Table 14.1) and refer the older person for a full automated perimetry test by an optometrist or ophthalmologist if any defects are found. Falls are mostly associated with a loss of field sensitivity rather than a loss of visual acuity and contrast sensitivity.[326]

Hospital staff should refer the older person to an optometrist, orthoptist or ophthalmologist for a full vision assessment if a more detailed visual assessment is needed once the older person has been assessed using the visual screening methods described above and detailed below in Table 14.1, or if the older person scores poorly on these tests.

14 Vision

Table 14.1: Characteristics of eye-screening tests

Snellen eye chart (for testing visual acuity)	
Description	Standardised eye test of visual acuity. Comprises a series of symbols (usually letters) in lines of gradually decreasing sizes. The participant is asked to read the chart from a distance of 6 metres for standard charts. Charts designed for shorter test distances are available; the examiner should check that they are using the correct working distance for the chart. Charts should be well lit and not obscured by glare or shadows. Visual acuity is stated as a fraction, with 6 being the numerator and the last line reading the denominator (the larger the denominator, the worse the visual acuity). Pocket versions of Snellen charts are available for a clinical screen of visual acuity (these smaller charts can be used at a shorter distance than the standard 6 metres to test visual acuity).
Time needed	5 minutes
Criterion	A score of 6/12 indicates visual impairment; however, this depends on the age of the person (the cut-off score will decrease with increasing age).
Pelli-Robson Test (for testing contrast sensitivity)[342]	
Description	The test presents 48 letters of the same size easily visible at the test distance of 1 metre. The letter sequences are organised into groups of three (triplets) with two triplets per line. Within each triplet, all letters have the same contrast. The contrast decreases from one triplet to the next. This test is useful for detecting early signs of glaucoma and cataracts.
Time needed	5 minutes
Criterion	Pelli-Robson contrast sensitivity scores of less than 1.5 indicate visual impairment, and a score of less than 1.0 indicates visual disability.
Confrontation Visual Field Test[343]	
Description	Crude test of visual fields. The participant and examiner sit between 66 cm and 1 metre apart at the same height, with the examiner's back towards a blank wall. To test the right eye, the participant covers the left eye with the palm of their hand and stares at the examiner's nose. The examiner holds up both hands in the upper half of the field, on either side of the vertical. Either one or two fingers on each hand are extended. The examiner then asks the participant, 'What is the total number of fingers I am holding up?' The procedure is repeated for the lower half of the field but changing the number of fingers extended in each hand. The procedure is repeated for the left eye. If the participant incorrectly counts the number of fingers in the upper or lower field, the test should be repeated and then recorded. If the participant moves fixation to view the peripheral targets, repeat the presentation. Results are recorded as finger counting fields R and L if the older person correctly reports the number of fingers presented. For those who fail this screening, a diagram should be drawn to indicate the part of the field in which the participant made an error.
Time needed	4 minutes
Criterion	If the participant incorrectly reports the number of fingers held up for either eye, they should be referred for a full visual field test.

14.2.2 Providing interventions

In the hospital setting, the following interventions associated with vision should be applied:

- On admission to hospital, identify any visual problems that an older person may have that can contribute to falls.
- If the older person has different prescription eyewear for reading and distance, ensure they wear distance prescription eyewear when mobilising.[124]
- Where a previously undiagnosed visual problem is identified, refer the older person to an optometrist or ophthalmologist for further evaluation.[124]
- Provide adequate lighting and contrast fixtures, and consider other environmental factors to help maximise visual cues and wayfinding for the older person.[344]
- Consider increased supervision for older people with impaired vision when moving away from their immediate bed surroundings.

14.2.3 Discharge planning

If an undiagnosed visual problem is detected in an older person while in hospital, encourage the older person to see an eye specialist when they are discharged. It is recommended to provide a referral to an:

- optometrist if the older person has lost their prescription eyewear
- ophthalmologist or an orthoptist if there is no known reason for poor vision.[124]

When a visual deficit is identified in an older person, the healthcare team should seek a diagnosis and offer an intervention. The following visual improvement interventions should be considered after discharge from the hospital:

Cataract surgery

Cataract surgery is the only evidence-based fall prevention intervention targeting vision that has been shown to be effective in reducing both falls and fractures in older people to date.[344-346]

Good discharge planning involves facilitating timely access to cataract surgery for both eyes for older people with clinically significant visual impairment primarily due to cataracts (unless contraindicated). See the Cataract Clinical Care Standard for best practice care for cataracts.

Occupational therapy interventions

Occupational therapy interventions are used for older people with moderate to severe visual impairment to manage the function and safety aspects of visual impairment.

Occupational therapists can assess the safety of an older person's home by identifying potential hazards, lack of equipment and risky behaviour that might lead to falls and harm from falls. They can then introduce interventions that help to address any issues identified, maximise visual cues and reduce visual hazards, including providing adequate lighting and contrast. For example, painting white strips along the edges of stairs and pathways.[347, 348]

Chapter 16 has more information on fall risk factors in an older person's environment.

Optimal prescription

If the older person wears prescription eyewear, ensure their prescription is correct and refer them to an optometrist if necessary.

If an older person requires new prescription eyewear, it is recommended that optometrists gradually adjust the lens prescription and counsel the older person on the likely short-term risks of a new prescription, including an increased risk of falling.[349]

Educating the health workforce

Educating health workers on how to manage older people with reduced visual function may help reduce the risk of falls.

Advice to the older person on appropriate prescription eyewear

If an older person regularly goes outside, it is recommended that the multidisciplinary team advise them to wear single-lens distance glasses when negotiating stairs or walking in unfamiliar surroundings, as bifocal, multifocal, and progressive lenses are associated with an increased risk of falling outside and on stairs.[331, 350]

Older people who wear multifocal and distance single-vision glasses should be encouraged to tilt their heads rather than lowering their eyes to look downwards to avoid postural instability.[351, 352]

[Point of Interest] Mobility training

Vision Australia specialises in providing safe mobility training for visually impaired people. https://www.visionaustralia.org.au

Case study

Ms J is 75 years old and fell while walking over a step in a doorway at home. On admission to the ward, Ms J was assessed by an ophthalmologist, who found that Ms J had severe visual impairment caused by macular degeneration.

Hospital staff inspected Ms J's glasses for scratches and ensured they were clean and fitted correctly. Staff also made sure that there was always adequate lighting in her room. Ms J was given clear instructions about how to move around and was encouraged to call for help when walking in unfamiliar surroundings.

On discharge, Ms J was advised to have a full eye examination to ensure optimal glasses correction. Given her severe visual impairment, Ms J was also referred for an occupational therapy home assessment.

14.3 Special considerations for cognitive impairment

Where possible, older people with cognitive impairment should have their vision tested using standard testing procedures.

Where this is not possible, visual acuity can be assessed using the Landolt C, Tumbling E chart or picture charts, none of which require letter recognition:

- **Landolt C** is a standardised symbol (a ring with a gap, similar to a capital C) used to test vision. The symbol is displayed with the gap in various orientations (top, bottom, left, right), and the person being tested must say which direction it faces.
- **The tumbling E chart** is similar but uses the letter E in different orientations.
- **Picture charts** present images of objects, such as a bird, cake, car or telephone, in diminishing sizes that may help provide an estimate of visual acuity for those with the capacity to undertake letter chart tests.

These tests include near-vision, distance and reduced Snellen tests and can be used to measure and record visual acuity in the same way as standard letter charts.

Additional information

The following resources and professional associations may be helpful:

- Cataract Clinical Care Standard, Australian Commission on Safety and Quality in Health Care
- Health professionals or carers can contact the Optometrists Association Australia in their state or territory for an up-to-date list of optometrists providing services in rural and remote areas.
- To find a local ophthalmologist, the older person's general practitioner or optometrist can provide a referral. Alternatively, contact the Royal Australian and New Zealand College of Ophthalmologists.

14 Vision

- Queensland University of Technology and Bradford University (UK) have published guidelines for optometrists to help prevent falls in older people.
- Vision Australia provides services for people with low vision and blindness across Australia, as well as a recommended Adult Referral Pathway for Blindness and Low Vision Services.
- Macular Degeneration Foundation promotes awareness of macular degeneration and provides resources and information:
- Guide dog associations in Australia help people with visual impairment to gain freedom and independence to move safely and confidently around the community and to fulfil their potential.
- Optometry Australia published guidelines for optometrists to help prevent falls in older patients: Optometry Australia

15 Hearing

15.1 Background and evidence

Hearing impairment is a common chronic condition in older adults, with prevalence rates ranging from 29% in those over 60 years to 72% in those over 70 years. Hearing impairment has been associated with a lower quality of life and is independently linked to walking difficulties, impaired cognition, functional decline and social isolation. [353,356-360]

15.1.1 Hearing impairment as a fall risk factor

Hearing impairment is known to contribute to falls in older people.

Older people with hearing impairments often have balance problems, which can increase the risk of falls. However, it is difficult to differentiate whether these are due to hearing impairment or other concomitant intrinsic risk factors.

Factors as to why hearing impairment may lead to falls include:

- People with hearing impairments may fail to detect environmental hazards outside their line of sight (such as a broom falling, a wheeled toy approaching, spilling liquid, etc.)[357-362]
- People with hearing impairment require more attention to detect and process auditory cues, leaving reduced attentional resources for other tasks, such as balance control.
- Impaired hearing is a marker of vestibular impairment, which reduces head and neck stability and balance control.[363] Thus, if generalised inner ear dysfunction occurs due to disease or degeneration, both hearing and balance impairments would follow.
- Poor hearing may indirectly lead to falls by reducing a person's participation in activities, resulting in subsequent muscle deconditioning and a decreased health-related quality of life. [357]
- Hearing aid use is low (20%) in those classified as having hearing loss.[358]

15.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

15.2.1 Addressing hearing impairment

As part of routine care, health professionals should address an older person's hearing loss.

The following strategies can be used to minimise hearing loss in older people when in hospital:

- On admission to hospital, identify any hearing problems that an older person may have that can contribute to fall risk.
- Use a pocket talker (a device that amplifies sound closest to the listener while reducing background noise) to communicate with an older person with a hearing impairment, as required and in line with the older person's preferences.
- Ensure older people who use hearing aids have them within easy reach, that the older person wears the hearing aids when mobilising and that the hearing aids are working.
- Consider increased supervision for older people with impaired hearing when they are moving away from their immediate bed surrounds.
- As part of good discharge planning refer older people with undiagnosed hearing problems to an audiologist.

[Point of Interest] Hearing Support

Better Hearing Australia provides support and education to help people in Australia with hearing impairment to maximise their hearing and improve their quality of life. https://www.betterhearingaustralia.online.

15 Hearing

Case study

Mr W, aged 85 years, was identified as having significant hearing impairment on admission to hospital. As a result, he was not able to easily communicate with hospital staff about his treatment and safe mobility on the ward.

Initially, a pocket talker (a device that amplifies sound closest to the listener while reducing background noise) was used to communicate with Mr W. It was also arranged for Mr W's daughter to bring his hearing aids to the hospital for him to use when conversing with others and mobilising.

Now able to hear more clearly, Mr W is much less agitated as he can appreciate his care plan and the need for safely mobilising while in hospital.

Additional information

Hearing Matters Australia

Australian Government's Hearing Services Program fully and partially subsidises some hearing devices

16 Environment

Recommendation

Home safety after discharge: As part of discharge planning, arrange for home safety interventions to be delivered by an occupational therapist for older people at an increased risk of falls after they have returned home. (Level 1A)

16.1 Background and evidence

For older people, the risk of falling while in hospital may be greater than in other settings because of risk factors such as unfamiliar surroundings and acute conditions like stroke, hip fracture and illness.[12] Older people with unsteady gait, confusion, urinary incontinence or frequency of using the toilet, a history of falls and those taking sedatives are those at highest risk for falls in hospital.[55]

Falls in hospitals are associated with high mortality and morbidity, with older people who fracture their hip in hospital having poorer outcomes than older people who fracture their hip in the community.[55]

Environmental review and modification involve identifying and minimising hazards in the hospital that might cause older people to fall. This includes removing clutter, improving lighting, supplying and repairing assistive devices and installing handrails.

Falls occurring in non-ambulatory older people are more likely to involve equipment and occur while the older person is seated or during transfers.[364] Therefore, interventions to reduce the risk of falls for these older people should consider transfer and equipment safety.

Fall prevention programs in hospitals that include modifying the hospital room or environment to reduce obvious risk factors appear to be effective for older people who are at higher risk of falling, such as those with cognitive impairment, heart conditions and stroke,[35] and those with long hospital stays.

16.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

16.2.1 Orientating older people to the hospital environment

Many falls occur during an older person's first few days in a new setting.[365] Hospital staff should orient the older person to the hospital environment, demonstrate how to use equipment – such as adjusting the bed, using walking aids and using the call bell – and instruct them on how to safely transfer between furniture or equipment.

Ensure the older person knows where their personal possessions are and that they can access them safely, including telephone, bedside table, water and glasses.

16.2.2 Assessing the older person in the hospital environment

Assessing the interaction between a person's functional capacity and environmental factors (known as the person-environment fit) is important when tailoring environmental adaptations.[366] How well the older person can function in an environment is a stronger determinant of falls than the number of environmental hazards.[367]

Seek input from the older person and their carers and family (to the extent that the older person chooses) regarding what they might perceive to be environmental fall risk factors for the older person that could be addressed.

See Chapter 6 for the various tools available for screening older people for fall risk in hospitals.

16.2.3 Multifactorial interventions that include the environment

Effective multifactorial interventions for older people in hospital should incorporate environmental modifications, such as:[33, 368-370]

- ensuring chairs and beds are at the correct height (i.e. when the older persons' feet are flat on the ground, their hips are slightly higher than their knees)
- providing adequate lighting with enough coverage to ensure clear vision and to prevent casting shadows
- providing appropriate signage in suitable script and language for navigation
- installing even lighting at stairs and way-finding night lighting to the toilet
- making sure night lighting is used consistently and safely
- installing slip-resistant floor surfaces
- cleaning spills and urine promptly
- reducing clutter and other trip hazards in older peoples' rooms and wards
- providing and repairing walking aids
- providing stable furniture at handhold distances for moving between furniture, beds, chairs and toilets
- ensuring bed, wheelchair and commode brakes are on when an older person is transferring
- ensuring bed, wheelchair and commode brakes are on when the older person is not being moved
- using a flooring pattern that does not create an illusion of slope or steps for older people with impaired eyesight or cognitive impairment
- making sure the older person wears safe footwear
- moving older people who have a higher risk of falling closer to the nurses' station
- using electronic warning devices
- eliminating the inappropriate use of restrictive practices.

Keep in mind that changing an older person's environment can have a negative impact. For example, reorganising furniture may be contraindicated for older people who are visually impaired or have dementia. Communicate with the older person and their carers and family (to the extent the older person chooses) to explain why changes to the older person's environment are necessary and identify changes that are safe and acceptable to all parties.

16.2.4 Incorporating safety into capital works planning and design

When hospitals or hospital wards are being built or renovated, the following issues should be considered:

- Safety and practicality are just as important as aesthetics.
- Conformance to relevant national, state and territory legislated safety requirements.
- A design that allows the observation and/or surveillance of older people as an important safety element.
- Lighting and handrails at steps and stairs, as well as stairs designed to allow safe descent. [368]
- Slip-resistant flooring and products should be used in all wet areas.[368]
- Impact-absorbent flooring (or underlay) should be used.

16.2.5 Providing equipment and storage

The risk of falls needs to be considered when new equipment is acquired and/or when equipment arrangements are being designed or modified, such as new seating, bedding, walking aids or shower chairs. Involve health professionals and hospital staff in decisions about selecting and buying equipment.

Clutter in the hospital should be reduced and safety improved by providing adequate storage space for equipment.[33] Equipment should be reviewed and audited at least monthly.[365]

16.2.6 Conducting environmental reviews

Regular environmental reviews of the hospital should be done with the following points in mind:

- Make modifications to policy and practice based on the findings of the environmental review. If changes to the environment are recommended as a result of the review, hospital staff should explore a range of products, equipment and solutions.
- Prioritise reviews by considering the following environments:
  - ☐ high-risk environments – bedrooms, hallways, bathrooms and toilets
  - ☐ environments identified through incident monitoring, hazard identification or near-miss reporting
  - ☐ other fall assessment tools, including environmental assessments.
- Include the hospital's external environments in environmental reviews.[33]
- Consider how environmental reviews align with existing workplace health and safety reviews.
- Involve a range of health professionals and disciplines in conducting the environmental reviews and interventions, including:
  - ☐ occupational therapists
  - ☐ workplace health and safety personnel
  - ☐ infection-control personnel
  - ☐ staff working in that particular environment
  - ☐ specialists in geriatric assessment or ergonomics
  - ☐ technical advisers, and
  - ☐ older people's carers, where appropriate.
- Ensure a mechanism is in place for anyone in the hospital to report environmental hazards.

16.2.7 Review and monitoring

Fall prevention interventions focused on the environment are often implemented in conjunction with other interventions, making it challenging to measure the effectiveness of an intervention in isolation from other risk factors.

The effectiveness of environmental interventions is likely to be reflected in fall indicators, such as a change in the location of falls and a reduction in falls associated with particular environmental hazards.

Staff should regularly review and assess environments in hospitals, particularly high-risk areas such as bedrooms, wards, bathrooms, and hallways.

Mapping falls

A floor plan of the hospital is a useful tool for mapping fall locations and for showing the number of falls and near misses in particular environmental hotspots. Mapping falls before and after environmental modification can provide useful information about the effectiveness of environmental adjustments.

16.2.8 Fall prevention on discharge from hospital

Approximately 15% of older people fall soon after they are discharged from the hospital (for any condition).[37]

Home visits for fall prevention by occupational therapists – including home assessments, recommendations and training in the use of mobility aids – help prevent falls in older people who have been recently discharged from hospital and can be particularly effective for those with a history of multiple falls.[39, 371]

Therefore, as part of discharge planning, hospital staff should arrange home safety interventions to be delivered by an occupational therapist for older people at an increased risk of falls after they have returned home.

Case study

Mr B is 93 years old and has been hospitalised in a subacute rehabilitation ward following a recent stroke. He has regained most of his movement; however, he finds it difficult to get out of bed, into his armchair, and go to the toilet.

Mr B's geriatrician undertook a medical review, and occupational therapy staff assessed his activities of daily living. His chair and bed height were adjusted; his family replaced his slippers with safer footwear, and LED night lights were provided in the toilet and as a way-finding guide to the bathroom. The staff were instructed on how to best help Mr B with transfers, given his condition.

Mr B now attends regular group sessions with the physiotherapist. As a result of this process, Mr B is now safer in his activities of daily living and has a lower risk of falling.

16.3 Special considerations for cognitive impairment

The physical environment takes on greater significance for people with diminished physical, sensory or cognitive capacity.[372] The unique characteristics of older people who are cognitively impaired may adversely affect their interaction with the environment. Some older people with cognitive impairment may need repeated orientation to the hospital environment.

In addition to reviewing environmental factors, hospital staff should ensure that older people who are agitated or exhibit behavioural disturbances are monitored adequately.

Specific environmental changes can help older people with cognitive impairment feel more comfortable and independent, reducing confusion and the risk of falls. For example, consider positioning the older person close to nursing staff, using bed or chair alarms, or using electronic surveillance systems. Other things that may help include:

- using calming colour schemes within the hospital to reduce agitation
- making sure the hospital layout supports improved continence; for example, the toilet is close by, is easy to find and is clearly marked
- providing a predictable, consistent environment
- using suitable furniture without sharp edges
- providing adequate lighting with enough coverage to ensure clear vision and to prevent casting shadows
- the use of restraint-free environments in 'delirium rooms' in hospitals that provide 24-hour nursing care and emphasise non-pharmacological approaches.[373]

Additional information

The following associations and organisations may be helpful:

- Occupational Therapy Australia
- Australian Standard: AS3811 Hard wired consumer communication and alarm systems for use in health care facilities.

17 Monitoring and observation

17.1 Background and evidence

Many falls that occur in hospitals are unwitnessed.[374,375]

The monitoring and observation of older people at higher risk of falling when getting out of bed or rising from a chair unsupervised, particularly those with cognitive impairment, has been shown to be effective in a range of care settings.

Monitoring and observation interventions that have been investigated and shown to be successful in preventing falls and harm from falls in the hospital setting include:

- locating the older person in an area of higher visibility, such as near the nursing station or in scope of video surveillance[124, 374]
- flagging those older people at higher risk of falling using fall risk alert cards or symbols[68]
- ensuring staff are aware of the fall-risk status of each older person and what level of supervision each older person requires
- making frequent, systematic observations of higher-risk older people [5]
- using sitter programs[48, 376]
- using alarm systems and alert devices[377, 378]

There is not enough evidence to date to demonstrate the effectiveness of recent technology focused on detecting falls through movement or fall detectors.[12]

Ethical considerations

The use of individual and large-scale observation, monitoring and surveillance systems has ethical and legal considerations. The planning and use of monitoring and surveillance systems should be discussed with older people and their carers and families (to the extent the older person chooses) to ensure that the monitoring does not infringe on the older person's right to privacy, autonomy or dignity of risk. Hospitals must have clear policies and procedures in place for using surveillance systems and obtaining informed consent from the older person.

17.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

The following general principles of individual monitoring and observation are based on good practice in the hospital setting.

Tailor the monitoring and observation to the person

The choice of monitoring and observation approaches will depend on a combination of the findings from the assessment of each older person, clinical reasoning and access to resources and technology. More than one monitoring and observation approach should be used, thereby avoiding dependence on a single approach.

The personal preference of the older person for the frequency of showers or personal hygiene needs to be considered on an individual basis and balanced against existing hospital routines.[379]

Ensure staff are available to provide adequate supervision

An important strategy to consider for improving the monitoring of older people is to review staff practices, such as staff handover practices and the timing of tea and lunch breaks, to ensure that adequate supervision is available when required.

Where possible, high-visibility beds or rooms (such as those near nurses' stations) should be allocated to older people who require more attention and supervision, including those with a higher risk of falling.[374]

17 Monitoring and observation

17.2.1 Flagging

Older people who have a higher risk of falling should be advised of their risk and be provided with education about fall prevention. A range of communication methods should be considered in discussion with the older person to ensure ongoing communication of higher risk status and education on reducing fall risk.

In hospitals, the older person's risk of falling should be identified ('flagged') in a way that respects their privacy yet is easily recognised by staff and the older person's family and carers. Consider using symbols rather than words to maximise the person's privacy.

Ways to visibly flag an older person's risk of falling include:

- coloured stickers or markers positioned on case notes, walking aids and bedheads [379]
- signs, pictures or graphics on or near the bedhead.[68,379]

Flagging reminds staff that a person has a higher risk of falling and should trigger interventions that may prevent a fall. Access to these interventions must be resourced, or flagging may not be beneficial. Flagging may also improve an older person's awareness of their potential to fall.[380]

Flagging as part of a multifactorial fall prevention program – including an information brochure, an exercise program, an education program and the use of hip protectors – has been shown to reduce the incidence of falls in older people who are at high risk of falls.[68]

17.2.2 Colours for stickers and bedside notices

It is recommended that a hospital introduce a consistent flagging system across the hospital. Green and orange are frequently used colours for stickers and bedside notices in Australian care settings to signify a high risk of falling. Ongoing staff education about the purpose and importance of flagging is essential to ensure the flagging system's effectiveness.

Ideally, in a hospital setting, older people who have a higher risk of falling should be checked at least every half hour and regularly offered assistance.[381] A staff member should remain with the higher-risk older person while the older person uses the bathroom.[381]

17.2.3 Sitter programs

Some hospitals have introduced sitter programs where volunteers, family members or paid staff sit with older people who have a higher risk of falling.[382] There is some evidence that providing sitters reduces inpatient falls in the time that sitters are present in a ward – generally in shifts across business hours on weekdays.[48, 376] There is moderate evidence that video monitoring was at least as effective as sitters in preventing falls and reduced the need for sitters in hospitals.[383]

Sitting programs may be appropriate if the sitters are trained and supported by hospital staff. Relevant policies and procedures should be in place.

17.2.4 Response systems

There is little evidence in the hospital setting to support the use of alarms or response systems that sound when a person moves or presses a button in reducing the risk of falls.[12]

Risk management issues

Response systems require capital investment and rely on hospital staff to respond when the alarm sounds. The issues of who responds and how, as well as the impact this has on ward practice, including what it may take away from other areas of care, need to be considered before implementing any system in a hospital.

Alarms may pose perceivable risk-management problems for hospitals, as failure to respond to an alarm due to a lack of staffing could be seen as a failure in care.

Alarms could also be perceived as infringing on an individual's autonomy. Therefore, ethical and legal considerations need to be evaluated before implementing any response system.

The use of response systems should not replace regular, individualised plans for the monitoring and observation of older people outlined in this chapter.

17.2.5 Automatic fall detection devices

There is a lack of real-world evidence to support the use of automatic fall detection devices in preventing falls and associated harm.[384]

Automatic fall detection devices include:

- **wearable devices**, such as watches, body-worn sensors or smartphones attached to the waist, which generally use accelerometers, tilt sensors, gyroscopes and barometers to detect changes in acceleration, planes of motion or impact to detect falls
- **non-wearable systems**, including cameras, acoustic sensors and pressure sensors placed in the person's environment to detect whether a person has fallen.

Limitations associated with automatic fall detection devices include:

- Older people must remember and choose to wear the device.
- Devices are dependent on battery power.
- Some devices rely on an internet connection or mobile phone service to communicate that a fall has occurred.
- Wearable devices may interfere with the older person's safe mobility and daily functioning.
- Devices may provide false alarms.
- People may have privacy concerns when using the device, as personal alarms require the user to register an account and provide a significant amount of personal data.
- Devices may be limited to a specific location or space.
- Devices can be expensive to purchase and involve ongoing costs associated with maintaining a subscription for 24-hour call centre support.

17.2.6 Review and monitoring

Evaluation of the effectiveness of individual monitoring and observation systems must be undertaken regularly and consider the range and mix of systems used.[48, 376] Indicators of the acceptance of these systems may include:

- frequency of use of monitoring and observation methods
- satisfaction of staff, older people and their carers and family with the individual monitoring and observation methods.

An indicator of the effectiveness of individual monitoring and observation systems may include the number of falls after an improved surveillance program has been introduced, compared with the number of falls before it was introduced.

Case study

Mr P is 81 years old and normally lives alone at home. He was admitted to the medical ward because he was malnourished, dehydrated and falling over weekly. Mr P was delirious on admission and frequently wandered out of the ward and into other older peoples' rooms, sometimes getting into the wrong bed.

The medical assessment of Mr P indicated the presence of acute delirium, and appropriate medical and nursing management was instituted. Mr P became quite agitated if made to sit by his bed and remain in the ward all day. Staff decided to place a chair near the nurses' station for him to sit on when he wanted. The physiotherapist assessed his mobility and arranged for family and available staff to take Mr P for a walk outside when possible.

Hospital volunteers, trained in the service's older persons sitter program, were also recruited to sit with Mr P and alert staff if he attempted to walk without supervision. As the delirium settled with medical and nursing management, Mr P became safer with his mobility and orientation, and the observation strategies were gradually withdrawn.

17.3 Special considerations for cognitive impairment

Individual monitoring and observation approaches are particularly useful for older people who are not aware of their fall risk or who have mobility limitations due to cognitive impairment.

Considerations regarding the use of monitoring and observation systems should be planned in consultation with the older person (using supported decision making when required), carers, family or substitute decision-makers (to the extent the older person chooses) to balance fall prevention interventions with the rights of the older person to privacy, autonomy and dignity of risk.[385]

Improved monitoring and observation may be preferable to the use of restrictive practices as an injury minimisation strategy for older people with cognitive impairment. [8]

Additional information

A range of alarm systems and alert devices are available for purchase, including motion sensors, video surveillance systems, and pressure sensors. They should be tested for suitability before purchase, with the upfront and ongoing costs considered. Their implementation should be supported by appropriate training and education for the older person and their carers, and response mechanisms should be arranged and tested.

A range of alarm systems and alert devices are available for purchase, including motion sensors, video surveillance systems, and pressure sensors.

In purchasing a personal alarm system, the older person and their support people should:

- test the system for suitability for the older person's needs, preferences and capabilities before purchase
- research the upfront and ongoing costs and ensure the older person understands these before purchase
- support the implementation of the alarm system in training and educating the older person in the use of the alarm system
- test the alarm response mechanism related to the system, including the older person's carers or family or the community care service.

18 Restrictive practices

18.1 Background and evidence

Restrictive practices are any practices or interventions that have the effect of restricting the rights or freedom of movement of individuals.[386] Restraint is a form of restrictive practice.

The use of physical restraints during hospitalisation has been linked to an increased risk of adverse hospital outcomes.[387] If used, restrictive practices should be the last option considered.[388]

18.1.1 Types of restrictive practices

The National Safety and Quality Health Service Standards address three types of restrictive practices as outlined below.[3, 388]

Mechanical restraint

Mechanical restraint is when a device is used to prevent, restrict or subdue movement to influence the behaviour of a person. This is to prevent the person from harming themselves or endangering others or to ensure that essential medical treatment can be provided.

Mechanical restraint includes belts, harnesses, manacles and straps that are difficult to get out of. Bed alarm devices can also be considered a mechanical restraint.

Covert mechanical restraint practices include tucking bedclothes in too tightly, wedging cupboards against beds or locking doors.

The use of a medical or surgical appliance for the proper treatment of physical disorders or injuries is not considered mechanical restraint.

Physical restraint

Physical restraint is the application by members of the healthcare workforce of hands-on immobilisation or the physical restriction of a person to prevent them from harming themselves or endangering others or to ensure that essential medical treatment can be provided.[389]

Chemical restraint[390]

Chemical restraint is a practice or intervention involving medications for the primary purpose of influencing a person's behaviour. This does not include the use of medicines prescribed for the treatment of a diagnosed mental disorder, physical illness or condition, or end-of-life care.

Medicines, such as sedatives and psychotropic medicines, have sometimes been used as chemical restraints. In most situations, this is regarded as an inappropriate form of restraint. However, when an older person's behaviour is disturbed, and their risk of falling is increased, there may be a case for chemical restraint.

[Point of Interest] Other restrictive practices[390]

The Aged Care Quality and Safety Commission recognises two additional types of restrictive practices in the context of people receiving aged care:

Environmental restraint involves a residential aged care service provider or its workforce restricting a person's free access to all parts of their environment to influence their behaviour. This includes items and activities.

Seclusion involves using solitary confinement to influence behaviour in a room or physical space. Voluntary exit is prevented, or it is implied that a person cannot leave the room or physical space at any hour of the day or night.

18.1.2 Restrictive practices and fall risk

Physical restraint of older people during admission to the hospital has been common practice for many years.[391,392] The prevention of falls is cited as the most common reason for using physical restraints.[393] However, evidence suggests that older people who are restrained are more likely to fall. [393, 394] In some instances, reducing the use of restrictive practices may decrease the risk of falling.[377]

A systematic review of the use of physical restraint and injuries found an association between restraint use and increased risk of injury and death.[393]

18 Restrictive practices

18.1.3 Behaviour support plans

In Australia, residential aged care service (RACS) providers are required to have a behaviour support plan in place for older people in the RACS who require or may require the use of restrictive practices as part of their care.[123] If relevant, the behaviour support plan will include information about how best to manage fall risk for the older person, considering their individual needs and circumstances.

Behaviour support plans are designed to inform the older person's ongoing care needs and enable ongoing updates as behaviour changes are observed or occur, or to reflect any new information received about the older person.

If an older person from a RACS who has a behaviour support plan in place is admitted to hospital, health professionals at the hospital should use the behaviour support plan to inform the individual care plan for the older person while in hospital.

18.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

Hospitals should have clear policies and procedures in place to eliminate the inappropriate use of restrictive practices in line with state or territory legislation and guidelines.

A hospital must have policies and processes in place to ensure the protection of the physical and mental health of all people admitted to the hospital. Policies and procedures should address the use of:

- restrictive practices in limited circumstances where informed consent is provided
- the restrictive practice in line with clinical advice
- restrictive practices that will prevent harm to the person and/or others, and a behaviour support plan for an older person when one is available.

The National Safety and Quality Health Service Standards provide advice on minimising restrictive practices in restraint and seclusion as part of the Comprehensive Care Standard.

Restrictive practices should not be a substitute for supervision, inadequate staffing or the lack of equipment.

18.2.1 Assessing the need for restrictive practices and considering alternatives

Causes of agitation, wandering or other behaviours should be investigated. Reversible causes of these behaviours, such as delirium, should be treated before the use of restrictive practices is considered.

When not to use restrictive practices

Restrictive practices should not be used at all for older people who:

- can walk safely
- wander, or
- disturb other older people.

18 Restrictive practices

Alternatives to the use of restrictive practices

Wandering behaviour in an older person warrants urgent exploration of other management strategies, including behavioural and environmental alternatives to the use of restrictive practices (see Chapter 8: Cognitive Impairment). These alternatives may include:[388]

- using strategies to increase observation or surveillance
- providing companionship
- providing physical and diversionary activity
- meeting the older person's physical and comfort needs, especially toileting, according to an individual's routine rather than the hospital's routine, as much as possible
- using low beds
- decreasing environmental noise and activity
- exploring the older person's previous routines, likes and dislikes, and attempting to incorporate these into the care plan.

Hospital staff should be provided with education on alternatives to restrictive practices. Education can reduce the perceived need to use restrictive practices, as well as minimise the risk of injury when restrictive practices are used.[395-399]

18.2.2 Using restrictive practice

When the older person's multidisciplinary team has considered all alternatives to restrictive practices and agreed that these alternatives are inappropriate or ineffective, restrictive practices may be considered. In such cases, restrictive practices should only be used temporarily to:

- prevent or minimise harm to the older person
- prevent harm to others
- optimise the older person's health status.

Rights and wishes of the older person

The multidisciplinary team must consider the rights and wishes of the older person, their substitute decision-maker, their carers and their family (to the extent the older person chooses). Any decision to use restrictive practices should be made by discussing the use of the restrictive practice, its benefits and harms, and possible alternatives with the older person and their substitute decision-maker, their carers and family (to the extent the older person chooses).

Implementing restrictive practices

When alternative strategies have not been successful, and the use of restrictive practices is being considered, the type of restrictive practice chosen should always be the least restrictive to achieve the desired outcome. Furthermore, restrictive practices should be continually monitored and evaluated.

If medicines are used specifically to restrain an older person, a minimal dose should be used, and the older person should be reviewed and monitored to ensure their safety. Importantly, chemical restraint must not be a substitute for alternative methods of restraint outlined in this chapter.

Documentation to support restrictive practices

Restrictive practices should not be applied without the support of a written order.[388] The minimum standard of documentation for the use of restrictive practices includes:[400]

- date and time of application
- name of the person ordering the restrictive practice
- type of restrictive practice
- reasons for the restrictive practice
- alternatives considered and trialled
- discussion with the older person, carers or substitute decision makers
- any restrictions on the circumstances in which the restrictive practice may be applied

- intervals at which the older person must be observed
- any special measures necessary to ensure proper treatment of the older person while the restrictive practice is applied
- duration of the restrictive practice.

18.2.3 Review and monitoring

Hospitals should regularly review their policies and procedures to eliminate the inappropriate use of restrictive practices within the hospital. Hospital staff should be assessed on their knowledge and skills in using alternatives to restrictive practices,[401] as well as their understanding of the hospital's restrictive practices policy.[377]

Trends in the use of restrictive practices should be monitored; for example, why a restrictive practice is used, for how long, and what alternatives were considered.[387] A restrictive practice-use form may be useful for this purpose.

Case study

Mr M is 70 years old and was recently admitted to the hospital for a routine hernia operation. He had no history of confusion but had recently fallen several times at home and suffered minor injuries. Immediately after the operation, Mr M became very confused, agitated and restless. He tried several times to get out of bed.

The medical review of Mr M indicated acute delirium, and medical management was instituted to address the cause. Given Mr M's current lack of awareness of his potential high risk of falling, he was allocated a bed in an area of high supervision and checked more frequently by nursing staff. Mr M's family were contacted and asked to help by sitting with him. The family preferred this option rather than using restrictive practices when Mr M's cognitive impairment and risk of falling were explained to them.

18.3 Special considerations for cognitive impairment

As with all older people, it is a requirement that restrictive practices are used only as a last resort for older people with cognitive impairment. That is after the older person's fall risk has been evaluated and alternative best practice behaviour management strategies have been trialled and documented.

There have been positive outcomes for older people with the use of restraint-free environments in 'delirium rooms' in hospitals that provide 24-hour nursing care and emphasise non-pharmacological approaches.[373] See Chapter 8 for more information on delirium.

Additional information

Below are some useful guidelines, policy statements and tools for the use of restraints and alternatives:

- National Safety and Quality Health Service Standards, Comprehensive Care Standard: minimising patient harm
- Clinical Practice Guidelines for the Management of Delirium in Older People
- Delirium Clinical Care Standard
- Further information about behaviour support plans is available on the Aged Care Quality and Safety Commission's website: Behaviour support plans | Aged Care Quality and Safety Commission

19 Hip protectors

19.1 Background and evidence

Hip fractures are fractures to the top of the femur (thigh bone) immediately below the hip joint and are usually the result of a fall.[402] Hip fractures are one of the more severe injuries associated with a fall and usually require surgery and lengthy rehabilitation with many older people not regaining their previous level of mobility.[403, 404] Pelvic fractures can also occur, although these are less common.

Hip protectors are one approach to reducing the risk of hip fracture. Hip protectors aim to reduce the risk of hip fractures by absorbing or dispersing forces away from the hip in the event of a fall onto the hip area. Hip protectors consist of undergarments with protective material inserted over the hip region. They are sometimes called 'hip protector pads', 'protector shields' or 'external hip protector pads. The guidelines refer to them all as hip protectors.

There are three types of hip protectors – soft, hard and adhesive – which are explained in detail below at 19.2.2.

Evidence for the use of hip protectors

There is some evidence that, when worn correctly, hip protectors may prevent hip fractures in older people in hospitals.[402,405] Wearing a hip protector may be a visual reminder of the consequences of falling and cause the older person to modify their behaviour to minimise the risk of falling. [402]

The key factors to the success of hip protectors in preventing harm from falls appear to be the:

- commitment of hospital staff to encourage the use of hip protectors by older people to improve health outcomes, particularly when supported by senior staff, and
- education of hospital staff and older people on how to wear hip protectors and the benefits of doing so.[406]

Hip protectors can, therefore, be used as part of a multifactorial falls and injury prevention intervention for older people in hospitals, although they will not prevent falls or protect other parts of the body.

19.1.1 How hip protectors work

Hip protectors work by absorbing or dispersing the energy created by a fall away from the hip joint, allowing the soft tissues and muscles of the surrounding thigh to absorb the energy. [402] Hip protectors must be worn over the greater trochanter of the femur to be effective.

Hip fractures

More than 95% of hip fractures occur from a fall with direct impact on the hip,[407] with only a small number of spontaneous fractures caused by osteoporosis or other bone pathology. Other hip fractures may occur if a person falls onto their buttock or if a rotational force through the neck of the femur is applied.[408]

The force generated by a fall from a standing height is approximately 6,000 newtons and has the potential to break the hip of a person of almost any age. The most effective padding system can reduce this to approximately 2,000 newtons in a laboratory test.[409, 410] Most research on hip protectors has evaluated hard hip protectors.

Surgically repaired hips

It is not necessary to wear a hip protector over a hip that has been surgically repaired with internal fixation or hip replacement because the neck of the femur has either been replaced or reinforced (hemiarthroplasty, pin and plate, etc.).[411] Equally, it has not been demonstrated to be harmful to wear a hip protector in these circumstances.

19 Hip protectors

19.1.2 Risks associated with hip protectors

Several risks are associated with the use of hip protectors by older individuals, with approximately 5% of wearers experiencing adverse effects.[412]

- Hip protectors can cause bruising if the person falls onto the hip protector.
- Skin infections and pressure ulcers (bedsores) can develop under or around the area where hip protectors are worn.
- For frail older people, hip protectors can cause difficulties with activities of daily living, especially toileting.[402] For example, older people can become less independent in everyday activities due to the extra time and effort needed to put on and take off the hip protectors. This can also cause incontinence in some older people.
- If dexterity is an issue for the older person, wearing hip protectors can increase their fall risk because they must manage the hip protector during dressing and undressing.

19.1.3 Adherence to the use of hip protectors

Adherence of both the older person and care staff to hip protector use is an issue in all care settings, with discomfort, impracticality with conditions such as urinary incontinence and the extra effort needed to put them on cited as the most common reasons for low adherence to hip protector use.[413-416]

Adherence to wearing hip protectors when recommended in warmer and more humid climates is lower, given the increased levels of discomfort associated with wearing the hip protector close to the skin.

Role of the hospital in influencing adherence to the use of hip protectors

If the hospital chooses to use hip protectors as a fall harm prevention intervention, the use of hip protectors must be supported by appropriate policies, procedures, and education and training for staff, as well as safe staffing levels.

A service commitment by the hospital to the benefits of hip protectors will influence the workforce's attitude to the acceptance and use of hip protectors for older people in preventing harm from falls.[402]

Providing hip protectors at no cost has been shown to increase initial acceptance and adherence to hip protector use in community-dwelling older people at high risk of hip fracture.[417, 418] This approach could be applied in the hospital context to increase adherence with the use of hip protectors.

Role of hospital staff in influencing adherence to the use of hip protectors

The attitudes and availability of staff in hospitals can have a substantial effect on whether an older person wears hip protectors.[419]

Structured education about the risk of hip fracture, fall prevention strategies and the use and effectiveness of hip protectors for hospital staff and the older person and their carers and family (to the extent the older person chooses) will improve hip protector acceptance and adherence.

Safe staffing levels in hospital will allow the workforce time to support older people in wearing hip protectors.

Supporting the older person to adhere to the use of hip protectors

Acceptance and adherence by older people in wearing hip protectors are mostly affected by the older person's understanding of the benefits and risks of wearing hip protectors[411] and by the type of hip protector.[402]

Education and training for the older person and their carers and family (to the extent the older person chooses) may improve acceptance and adherence to the use of hip protectors by addressing any barriers that the older person sees to wearing hip protectors and providing instructions and demonstrations on how to wear them.[419-421]

19 Hip protectors

19.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

To support older people in making an informed decision about wearing hip protectors, involve them in discussions about options for hip protectors and offer choices in terms of types and sizes in line with their needs and preferences.

Soft, energy-absorbing protectors are often reported to be more comfortable to wear in bed. A choice of underwear styles and materials means that problems with hot weather, discomfort, accommodating incontinence aids and appearance can be addressed.

19.2.1 Assessing the need for hip protectors

When assessing an older person's need for hip protectors, hospital staff should consider:

- if the older person has a recent history of falls
- the older person's age
- the older person's mobility
- whether the older person has a disability
- whether the older person is unsteady on their feet, and
- whether the older person has osteoporosis or osteomalacia.

Assessing the older person's cognition and independence in daily living skills (e.g., dexterity in dressing) may also help determine whether the older person will be able to use hip protectors.

For older people known to have balance difficulties and who wander, hip protectors may need to be used with an additional risk-management strategy.

Fall risk assessment tools

Hospital staff can use a fall risk assessment tool (see Chapter 6) and/or fracture risk assessment to determine whether an older person has a high risk of hip fracture and should be considered for the use of hip protectors.

Two web-based fracture risk calculators are:

- Fracture Risk Assessment Tool (FRAX)
- Garvan Institute of Medical Research. Fracture risk calculator.

19.2.2 Types of hip protectors and how to wear them

There are three types of hip protectors:

Soft hip protectors (type A)

Soft hip protectors are available in a variety of designs. Their common feature is that they are made from a soft material rather than a rigid plastic shell. They seem to work mainly by absorbing the energy of the fall.

Soft hip protectors must be held in place over the greater trochanter of the femur if the hip protectors are to be of any benefit.[422]

Continence pads can be worn comfortably with soft hip protectors, but they should be fitted first, next to the older person's skin, before the hip protectors are put on.

As a general observation, Type A is preferred in hospitals because Type B presents laundering difficulties.

Hard hip protectors (type B)

Hard hip protectors consist of a firmer, curved shell, sewn or slipped into a pocket in a lycra undergarment, similar to underpants or bike pants. They divert the force of the fall from the bones of the hip to the surrounding muscles of the thigh.

Hard hip protectors are held in place over the hip by lycra undergarments similar to underpants or bicycle pants. Different sizes (small to extra-large) and designs are available for both men and women.

Continence pads can be worn in separate pants, underneath the garments holding the hip protectors.

Adhesive hip protectors (type C)

Adhesive hip protectors are adhesive hip pads that are attached directly to the wearer's skin.

While self-adhesive hip protectors may be appealing as they can be worn with the older person's undergarments, there is insufficient evidence to support their safe use in the long term.

19.2.3 Using hip protectors at night

An older person's risk of falling and breaking a hip can increase during the evening and night. Therefore, older people who get out of bed to go to the toilet at night may benefit from wearing hip protectors when they go to bed, particularly if they have:

- a higher risk of falling
- osteoporosis
- a history of falling at night.

The soft hip protectors (type A) are relatively comfortable when correctly positioned and can be worn more easily in bed. The soft hip protectors are less obtrusive than the hard hip protectors (type B).

19.2.4 Cost of hip protectors

The cost of hip protectors appears to be a factor influencing uptake. Reimbursement by private health funds or appliance supply schemes may help alleviate this issue.

It is unclear to what degree cost affects adherence with the longer-term use of hip protectors.

19.2.5 Training in hip protector use and care

Fitting and managing hip protectors are often the responsibilities of a particular member of the multidisciplinary team in the hospital. Nurses and other care staff are in a key position to encourage an older person's adherence to using hip protectors, as they often assist frail older people with dressing, bathing and toileting. Nurses and other care staff should have education and support in developing strategies to encourage adherence to the correct use of hip protectors. This includes educating the older person and their carers and family (to the extent the older person chooses) on the correct application of hip protectors and addressing the barriers that the older person sees to wearing hip protectors.

Before the older person starts wearing hip protectors, hospital staff should discuss the arrangements for cleaning the hip protectors with the older person and their carers and family (to the extent the older person chooses). Washing in domestic washing machines and dryers is feasible, but some hip protectors will not withstand commercial laundering.

19.2.6 Review and monitoring

Currently, the design and production of hip protectors are unregulated, and there are no national or international testing procedures in place for their effectiveness.[402]

A standard definition of adherence to the use of hip protectors should be used when reviewing and monitoring their use.[423] The most easily measured marker of adherence is the number of 'protected falls', which is the proportion of falls in which a hip protector is worn.

19 Hip protectors

Case study

Ms F was hospitalised after a fall in which she sustained a fractured pelvis. In the rehabilitation ward, she agreed to use hip protectors. The ward nurses showed Ms F how to use the hip protectors and encouraged their use in the hospital. She continued to wear them at home after being discharged from hospital.

Ms F's adherence to using the hip protectors was checked when she attended the clinic for a follow-up visit. While watering her garden, Ms F fell onto the hip protectors. A fracture was likely prevented as she had a bruise on her upper thigh under the hip protector.

19.3 Special considerations for cognitive impairment

Older people with cognitive impairment have a higher prevalence of falls and fractures[424] and should be considered for hip protector use. Older people with cognitive impairment often need help learning to use and continuing to use hip protectors.

Additional information

Two web-based fracture risk calculators are:

- Fracture Risk Assessment Tool (FRAX)
- Garvan Institute of Medical Research. Fracture risk calculator.

20 Vitamin D and calcium

20.1 Background and evidence

Low vitamin D levels have been associated with reduced bone mineral density, high bone turnover and increased risk of hip fracture.[425] The potential effects of vitamin D deficiency on muscle cells and fibres are linked to calcium/ phosphate handling, muscle fibre differentiation, expression of contractile proteins and mitochondrial fuel metabolism.[426] Vitamin D deficiency has been associated with osteoporosis, urinary incontinence, cognitive decline and macular degeneration.[427]

Vitamin D may prevent falls by improving muscle strength[428] and psychomotor performance, independent of any other role in maintaining bone mineral density.[429, 430]

Calcium is essential for building and maintaining healthy bones throughout life. Recommended daily intake for calcium with vitamin D supplementation can help decrease fall risk.[431]

[Point of Interest] How vitamin D reduces the risk of falling

The active vitamin D metabolite (25-hydroxyvitamin D) binds to a highly specific nuclear receptor in muscle tissue. This improves muscle function, which in turn may be the reason why vitamin D reduces the risk of falling.[429]

20.1.1 Incidence and risk of vitamin D deficiency

Vitamin D levels are measured by blood serum 25-hydroxyvitamin D (25(OH)D) levels. The incidence of vitamin D deficiency (25(OH)D levels less than 25 nmol/L) in Australia has been reported as 22% to 86% in residential aged care, 67% of geriatric hospital admissions, and 61% of older people with hip fractures across all settings.[431]

Older people who have a high risk of vitamin D deficiency include those:

- residing in residential aged care
- with skin conditions that require them to avoid the sun
- with dementia
- from culturally and linguistically diverse groups
- with malabsorption
- with dark skin, as increased skin pigmentation reduces the amount of vitamin D production after sun exposure
- who are heavily clothed and/or veiled for religious or cultural reasons[431, 432]

20.1.2 Intervention approaches for improving vitamin D levels

Intervention approaches for improving vitamin D levels in older people have varying levels of success. These include:

- vitamin D supplementation alone as cholecalciferol or vitamin D3
- vitamin D supplementation, together with calcium supplementation
- exposure to sunlight.

Vitamin D supplementation (with or without calcium)

Vitamin D supplementation, with or without calcium, has been shown to be effective in improving bone mineral density in older people and preventing falls across all care settings.[433-435] The benefits of supplementation are more certain in older people who are vitamin D deficient.[435] Bone mineral density increases whether the vitamin D is administered orally or injected.[12]

There is little evidence to demonstrate any effect of vitamin D supplementation on fall-related fractures.

Calcium supplementation

Healthy Bones Australia (formerly Osteoporosis Australia) recommends a daily intake of 1,300 mg of calcium for men aged over 70 and women aged over 50 to maintain healthy bone density. Below these ages, the recommendation is 1,000 mg per day for both men and women.[436]

The best way to achieve recommended calcium intake is to eat a diet rich in calcium. When consumed, a small amount of calcium is absorbed into the blood and used for the healthy functioning of the heart, muscles, blood and nerves.

Calcium supplementation, when administered with vitamin D (or its analogues), has been shown to increase bone density and reduce the incidence of falls.[12, 431] A maximum dose of 500 – 600 mg elemental calcium per day is recommended if dietary calcium intake is insufficient due to concerns about calcium supplementation increasing the risk of cardiovascular events.[437, 438]

Vitamin D, sunlight and winter

The body's primary source of vitamin D is exposure to sunlight through the skin. Sourcing vitamin D from dietary intake alone is insufficient to achieve healthy levels of vitamin D.[431]

Sun exposure may be less effective in older people if their skin does not efficiently convert cholesterol precursors to vitamin D. Frail older people may be at greater risk of vitamin D deficiency because sun exposure recommendations can be difficult for them to meet due to mobility issues.

The Geelong Osteoporosis Study found that, in winter, serum vitamin D levels are reduced, bone resorption is increased, and the proportion of falls resulting in fractures increases.[438] The role of vitamin D supplementation during the Australian winter has yet to be investigated.

[Point of Interest] Vitamin D and latitude

Little vitamin D is produced in winter by people who live beyond latitudes of about 35° (i.e. Victoria and Tasmania), especially in older people. An increase in the zenith angle of the sun (the angle between directly overhead and a line through the sun) during winter means more photons are being absorbed by the stratospheric ozone layer and less reaching earth to allow healthy daylight skin exposure for vitamin D absorption.[432]

Nutrition management

Nutrition management is an important element of good aged care practice and can play an important role, directly and indirectly, in some aspects of fall prevention. For example, good nutrition is essential to achieve the optimal benefits of an exercise program, which can improve balance and mobility, ultimately leading to a reduced risk of falling. Additional dairy foods in an older person's diet can improve calcium and protein intake, which can contribute to a reduced risk of falls and fractures.[439]

Nutrition is not included as a separate core fall prevention activity in the Fall Guidelines as, to date, it is an area with limited research to guide best practice in fall prevention.

20.1.3 Toxicity and dose of vitamin D supplementation

Toxicity risk with vitamin D supplementation

Safety considerations in managing vitamin D supplementation for older people in care:

- Vitamin D supplementation can cause toxicity.[440] Prolonged sun exposure does not cause toxicity.
- Hypercalcemia may occur if vitamin D is given, particularly in the form of vitamin D analogues.
- There is a small but significant increase in gastrointestinal symptoms and renal disease associated with the use of calcium and vitamin D supplementation.[441] There is no increased risk of death.
- Toxicity with cholecalciferol (vitamin D3) up to 10,000 international units daily occurs predominantly when dietary or oral calcium supplements are high or when granulomatous disorders are present. This is rare.

20 Vitamin D and calcium

Dose of vitamin D supplementation

There is no recommended daily intake for vitamin D, although trials that show benefit from vitamin D have used a minimum of 800 international units daily.[434] According to Healthy Bones Australia, to prevent vitamin D deficiency in older people who receive less than optimal sun exposure, vitamin D supplementation is recommended:

- at least 600 international units per day for people under 70 years of age
- at least 800 international units per day for people over 70 years of age
- sun avoiders or those at high risk of deficiency (housebound or in residential care) may require 1,000 to 2,000 international units per day.[431]

Higher doses are required for older people who are shown to have vitamin D serum levels lower than 50 nmol/L.

There is evidence in community settings that high doses of Vitamin D supplementation (monthly and once yearly) result in an increased risk of falls.[442]

20.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

20.2.1 Interventions for preventing falls

The basic principles of vitamin D interventions for preventing falls in older people are to:

Assess the adequacy of the older person's vitamin D and calcium levels

Hospital staff can assess the adequacy of the older person's vitamin D and calcium levels by using:

- food preference records
- food and fluid intake records
- 25(OH)D blood levels
- a history of the older person's daily routine.

Analysis of food intake records or diet history should show a daily intake of calcium of 800 mg for men and 1,000 mg for women.

Ensure the older person receives minimum sun exposure to prevent vitamin D deficiency

Healthy Bones Australia (in association with the Cancer Council Australia) recommends that for most older Australians, vitamin D deficiency can be prevented by 5 to 15 minutes of exposure of the face and upper limbs to sunlight four to six times per week. Note: Exposure to sunlight must occur outside, as window glass absorbs nearly all ultraviolet B photons, which are required for vitamin D production.

Deliberate exposure to sunlight between 10 am and 3 pm in the summer months for more than 15 minutes is not advised, nor is overexposure. If this modest sunlight exposure is not possible, then a vitamin D supplement of at least 800 international units per day is recommended.

Consider vitamin D and calcium supplementation

For confirmed cases of vitamin D deficiency, Healthy Bones Australia recommends vitamin D supplementation with 3000–4000 international units per day for 6-12 weeks, followed by a maintenance dose of 1000-2000 international units per day.[443]

Use caution for women over 70 years old.

Use caution with calcium supplementation in women older than 70 years, as there is a possible association with cardiovascular events.[437, 444] Dietary calcium, as opposed to mineral supplementation, should be encouraged. A maximum supplementation dose of 500 mg/day should be considered if daily dietary intake does not reach 1,000 mg.

Encourage a nutritious diet that allows for calcium intake and absorption

Hospital staff can encourage older people to include foods high in calcium in their diets. Improving calcium and protein intake by consuming dairy foods such as milk, yoghurt and cheese has been linked to a reduction in the risk of falls and fall-related harm in older people.[439]

Hospital staff can discourage older people from consuming foods that prevent calcium absorption.

Referral to a dietitian may be appropriate if an older person has difficulty consuming adequate calcium, has lactose intolerance, does not typically include calcium as part of their diet (due to cultural reasons), or does not consume dairy products (e.g., follows a vegan diet).

Case study

Ms K was admitted to hospital following a fall. In keeping with her culture and religious beliefs, she only allows her face, hands and feet to be exposed. Blood tests revealed severe vitamin D deficiency with a vitamin D level of 12 nmol/L.

Ms K's deficiency was initially managed with 3,000 IU units of vitamin D administered daily for one month. This was reduced to 800 international units per day after the initial replacement period.

Because Ms K was admitted to the hospital after a fall, the hospital staff reviewed her medicines while she was in the hospital, and an occupational therapist undertook a home assessment before Ms K was discharged.

20.3 Special considerations for cognitive impairment

Cognitive impairment in older people can be associated with nutritional deficiencies, as cognitive impairment may result in reduced oral intake of calcium. Cognitive impairment is also associated with reduced exposure to sunlight, particularly when outdoor mobility is limited.

Oral calcium and vitamin D supplementation are often necessary to maintain adequate levels of both calcium and vitamin D in this population.

Medicine adherence may be problematic in some older people with cognitive impairment. In these cases, the possibility of intramuscular preparation of vitamin D may need to be considered.

Hospital staff should closely monitor an older person's oral intake of calcium and vitamin D and refer them to a dietitian if intake is low.

Additional information

The following publications provide useful information on dietary intake of vitamin D and calcium:

- Australian Dietary Guidelines, published by the National Health and Medical Research Council (2013):
- Guidelines and Statements from Healthy Bones Australia (Formerly Osteoporosis Australia)
- Healthy Bones Australia (Formerly Osteoporosis Australia) provides information and resources to reduce fractures and improve bone health in the community:

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Recommendation

Hip fracture care: Following a hip fracture in an older person, provide post-operative care in a geriatric orthopaedic service with a multidisciplinary comprehensive geriatric assessment, management, and rehabilitation. (Level 1B)

21.1 Background and evidence

Osteoporosis is characterised by both low bone mineral density and microarchitectural deterioration of bone tissue, leading to decreased bone strength, increased bone fragility and a consequent increase in fracture risk.[445]

Osteoporosis is a common disease in Australia, with 66% of people aged over 50 years living with osteoporosis or osteopenia (low bone density).[446]

People who are very old, or have osteoporosis or osteopenia, have an increased fracture risk due to low bone mineral density, as well as an increased fracture risk with each additional fall. [446]

The updated Australian recommendations for the prevention of osteoporosis fractures in residential aged care, published in 2022, were used to inform this chapter.[447]

21.1.1 Falls and fractures

Only a small proportion of falls result in fractures, but most fractures occur after falls.[448]

A previous minimal trauma fracture is one of the strongest risk factors for future fractures.[449]

Bone mineral density (BMD), quadriceps strength and postural sway are three key factors that contribute to a person's fracture risk.[450] BMD and is an important measure in predicting fractures in both men and women. [450] No therapy is likely to normalise BMD, but small improvements can reduce fracture risk.[451]

Interventions that reduce the risk of falls may prevent fractures, even if bone density is not altered. This is particularly relevant to the very old, who have an increased fracture risk due to low BMD and whose likelihood of a fracture increases with each additional fall.

21.1.2 Diagnosing osteoporosis

The Royal Australian College of General Practitioners (RACGP) guidelines on managing osteoporosis state that a minimal trauma fracture of the hip or spine in a person older than 50 years of age is presumptive of osteoporosis and that treatment may be initiated without confirmation of low BMD.[445]

A 20% or greater loss of anterior or mid vertebral height relative to posterior height is sufficient to diagnose osteoporosis for the purpose of prescribing under the Pharmaceutical Benefits Scheme (PBS).

Hospital staff, particularly in emergency departments, should be vigilant in detecting anyone who has clear indicators of osteoporosis, such as thoracic kyphosis or a minimal trauma fracture.

Older people with multiple risk factors for osteoporosis may be detected opportunistically in hospitals, particularly in those receiving general medical care.

Fracture risk assessment

A fracture risk assessment can help determine whether an older person is at a high risk of hip fractures and should, therefore, be considered for osteoporosis treatment.

Two web-based fracture risk calculators are:

- Fracture Risk Assessment Tool (FRAX)
- Garvan Institute of Medical Research. Fracture risk calculator.

Bone mineral density test

Osteoporosis can be diagnosed through a BMD test, which measures the amount of minerals in a specific area of bone, typically at the hip and spine. The most reliable and accurate test of BMD is done by scanning the skeleton using dual-energy X-ray absorptiometry (DXA), which is widely available in Australia.

The DXA test will give results as a T-score and a Z-score, as detailed in Table 21.1.[442]

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Table 21.1: Dual-energy X-ray absorptiometry (DXA) test results

Score	DXA test detail
T score	Compares bone density with that of an average young adult of the same sex.
	A T score of −1 or above (>−1) is normal, and no treatment is necessary.
	A T score between −1 and −2.5 indicates lower than normal bone density (osteopenia), and the older person has several clinical risk factors for osteoporosis. Treatment should be considered.
	A T score below –2.5 (<2.5) indicates osteoporosis, and treatment is strongly recommended to stop further bone loss and fractures.
Z score	Compares bone density with the average from the person's age group and sex.
	A Z-score of 1 or above (>1) indicates the person's bone density is higher than others of the same age and sex.
	A Z score of zero (0) indicates the bone density is average for their age and sex.
	A Z score of −1 indicates bone density is below average density.
	A Z score below –2 (<− 2) indicates that bone is being lost more rapidly than matched peers, so treatment needs to be monitored carefully.
	A Z score below –2 (<−2) may also indicate that an underlying disease is responsible for osteoporosis.

21.1.3 Evidence for pharmacological interventions

Medicines shown to be effective as first-line treatments of osteoporosis include bisphosphonates (risedronate, zoledronic acid and alendronate) and denosumab. These are oral or intravenous anti-resorptive medicines for people who have low bone density,[452, 453], with evidence that they effect a reduction in spine, hip and non-vertebral fractures. [453] Table 21.1 provides a full list of osteoporosis medicines available under the PBS.

Selective oestrogen receptor modulators are used for postmenopausal women with osteoporosis and have been shown to increase bone density and reduce the risk of fractures in the spine.[446]

Second-line therapy for osteoporosis management is restricted to people who are deemed to have failed treatment with first-line agents and are deemed at very high fracture risk. A non-general practitioner specialist or consultant physician must initiate the prescription of these agents.

Vitamin D and calcium supplementation

As most trials of antiresorptive agents have used concomitant calcium and vitamin D (see Chapter 20), it is appropriate to ensure that vitamin D deficiency is corrected and to add a low-dose calcium supplement to these therapies when dietary calcium intake is suboptimal. Calcium and/or vitamin D alone are not recommended for fracture prevention.[453] Vitamin D should be considered for the prevention of osteomalacia in individuals at risk of developing this condition.[454]

Risks associated with osteoporosis medicines

The responsible prescriber must consider the known risks associated with bisphosphonates, denosumab, and other osteoporosis medicines, as well as the manufacturer's advice, and ensure that these risks are communicated to the older person and their carers and family (to the extent the older person chooses).

Further information on the pharmacologic approaches to the prevention and treatment of osteoporosis in older people is available in the RACGP's Guidelines.

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21.2 Principles of care

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

Hospitals should establish protocols to increase the rate of osteoporosis treatment in older people who have sustained their first osteoporotic fracture.[455]

21.2.1 Assessing bone health

The RACGP guidelines on managing osteoporosis state that an older person who has sustained a minimal trauma fracture of the hip or spine can be presumed to have osteoporosis. [445] It is also likely that any minimal trauma fracture sustained by an older person is an indication of osteoporosis. [13] Therefore, health professionals should consider bone densitometry and specific anti-osteoporosis therapy for these older people.

Older people with a history of minimal trauma fracture should receive a bone health check, as a previous fracture is one of the strongest risk factors for a subsequent fracture.[456]

Older people who sustain a minimal trauma fracture should also be assessed for their risk of falls following the fracture.

Informal screening for signs of osteoporosis using clinical judgement

The multidisciplinary team should be on alert for anyone who has signs of osteoporosis. For example, thoracic kyphosis, loss of height or previous minimal trauma fracture.

Staff can screen for osteoporosis using indirect indicators or risk factors, such as asking about the older person's lifestyle, including whether they are reluctant to go outside. Understanding how often an older person goes outside is especially important if they live in the southern states of Australia, where there is less exposure to ultraviolet light in winter and a greater risk of vitamin D deficiency (see Chapter 20 on vitamin D supplementation).

21.2.2 Providing interventions

Older people with a history of recurrent falls or those who have sustained a minimal trauma fracture should receive interventions to reduce future fracture risk, particularly when a diagnosis of osteoporosis has been made.[457]

Pharmacological interventions are the primary treatment options for osteoporosis and reducing the risk of fractures.

Table 21.2 provides specific PBS subsidy details for the medicines that are effective in improving bone mineral density in different populations. Note: All agents require authority permission for prescription.

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Table 21.2: Pharmaceutical Benefits Scheme (PBS) details for osteoporosis medicines

Medicine	Subsidised indications
Alendronate	Treatment as the sole PBS-subsidised antiresorptive agent for osteoporosis in a person aged ≥70 years with a bone mineral density T-score of –2.5 or less. Treatment as the sole PBS-subsidised antiresorptive agent for established osteoporosis in people with fracture due to minimal trauma. It is a potent inhibitor of bone resorption. It increases bone density and reduces the frequency of fractures at the hip and spine.[452, 458]
Risedronate	Treatment as the sole PBS-subsidised antiresorptive agent for osteoporosis in a person aged ≥70 years with a bone mineral density T-score of –2.5 or less. Treatment as the sole PBS-subsidised antiresorptive agent for established osteoporosis in people with fracture due to minimal trauma. It is a potent inhibitor of bone resorption. It increases bone density and reduces the frequency of fractures at the hip and spine. [452, 458]
Zoledronic acid	Treatment as the sole PBS-subsidised antiresorptive agent for: (a) established osteoporosis in women with fracture due to minimal trauma; or (b) established osteoporosis in men with hip fracture due to minimal trauma; or (c) for osteoporosis in women aged ≥70 years with a bone mineral density T-score of –3.0 or less (only 1 treatment each year for 3 consecutive years per person is subsidised). Used to treat osteoporosis and prevent fractures. It is a potent inhibitor of bone resorption. It works for a long time, so only a single dose is required each year.[452, 458]
Denosumab	Treatment as the sole PBS-subsidised antiresorptive agent for osteoporosis in a person aged ≥70 years with a bone mineral density T-score of –2.5 or less. Treatment as the sole PBS-subsidised antiresorptive agent for established osteoporosis in people with fracture due to minimal trauma. It is a human monoclonal antibody that inhibits the development and activity of osteoclasts, thereby decreasing bone resorption and increasing bone density, and is available as a subcutaneous injection administered every 6 months.
Raloxifene	Treatment as the sole PBS-subsidised antiresorptive agent for established postmenopausal osteoporosis in people with fracture due to minimal trauma. It is a selective oestrogen receptor modulator that increases bone density and reduces the risk of fractures in the spine. Evidence also shows that it reduces the incidence of breast cancer.[449]
Teriparatide (second-line therapy)	Treatment as the sole PBS-subsidised agent by a specialist or consultant physician for severe, established osteoporosis in a person with a very high risk of fracture who: (a) has a bone mineral density T-score of –3.0 or less; and (b) has had two or more fractures due to minimal trauma; and (c) has experienced at least one symptomatic new fracture after at least 12 months of continuous therapy with an antiresorptive agent at adequate doses. It is a parathyroid hormone analogue that stimulates osteoblast activity, thereby promoting bone formation. It is given subcutaneously on a daily basis for up to 18 months. Prescription can only be initiated by a specialist or consultant physician.

Romosozumab (second-line therapy)	Treatment as the sole PBS-subsidised agent by a specialist or consultant physician for severe, established osteoporosis in a person with a very high risk of fracture who: (a) has a bone mineral density T-score of –3.0 or less; and (b) has had two or more fractures due to minimal trauma; and (c) has experienced at least one symptomatic new fracture after at least 12 months of continuous therapy with an antiresorptive agent at adequate doses. It is a monoclonal antibody that inhibits the action of sclerostin and is given as a monthly subcutaneous injection for up to 12 months. It has been shown to reduce fracture risk and improve bone mineral density in the spine and hips.[459-461] Prescription can only be initiated by a specialist or consultant physician.

21.2.3 Review and monitoring

A good-practice clinical indicator among hospital populations is to review an older person's medicines chart to see whether the older person has been prescribed vitamin D supplements, as this can indicate that the older person has been identified as having reduced bone density and is at risk of osteoporosis.

Case study

Ms E, who is 75 years old, fell and fractured her humerus (upper arm) and was admitted to her local hospital. Specific questioning revealed that she had early menopause and that she rarely goes outside because of concerns about skin cancer. The orthopaedic surgeon treated Ms E's fracture.

The nurse at the hospital clinic asked the doctor whether the fracture was related to osteoporosis and whether there was some way to reduce the chance of further similar falls and fractures. As a result of their discussion, the surgeon suggested that Ms E start taking calcium and vitamin D supplements and referred her to the osteoporosis clinic for a weekly bisphosphonate review, a nutritional review, and strength and balance training.

21.3 Special considerations for cognitive impairment

Older people with cognitive impairment should be supervised in the correct and safe manner of taking oral bisphosphonates, as there are restrictions on lying down or eating after taking these medicines. Intravenous medicines might be an appropriate alternative for some older people with cognitive impairment.

Additional information

The following resources provide definitive information on osteoporosis management, particularly related to medicines:

- The Royal Australian College of General Practitioners, Osteoporosis prevention, diagnosis and management in postmenopausal women and men over 50 years of age, 2nd edition.
- The National Institute for Health and Clinical Excellence (NICE), an independent organisation in the United Kingdom, produces clinical practice guidelines, including guidelines on osteoporosis management, based on the best available evidence. The guidelines provide recommendations on the appropriate treatment and care of people with specific diseases and conditions.
- Healthy Bones Australia (formerly Osteoporosis Australia) is a national organisation dedicated to reducing fractures and improving bone health in the community. Toll-Free: 1800 242 141

22 Post-fall management

22.1 Background

All falls in hospital must be taken seriously and require an immediate response. This includes falls that result in minor or no injury. Falls may be the first and main indication of another underlying and treatable problem in an older person. Also, older people who fall are more likely to fall again.[448]

All hospital staff should be aware of:

- what constitutes a fall
- what to do when a person falls
- what follow-up is necessary, including reporting and incident management processes
- the need to reassess the older person's fall risk following a fall, and
- the need to implement actions to address the older person's fall risk factors to reduce the risk of another fall.

Person-centred care involves partnering with the older person to understand their needs, goals and preferences and develop an individualised plan for care that identifies appropriate fall prevention interventions. Involve the older person's carers and family to the extent the older person chooses.

22.2 Best practice care in responding to falls

Providing post-fall response and assessment immediately after a fall is essential in delivering safe clinical care to older people in hospital.

The circumstances surrounding a fall are of critical importance. To gather information regarding the fall, hospital staff may need to speak to the older person, staff, visitors and witnesses. This may be particularly important if the older person does not recall the circumstances of the fall.

22.2.1 Policy for preventing and responding to falls

Hospitals should have a falls incident policy or follow a clinical practice guideline for preventing and responding to falls. Staff should be made aware of and have access to these policies or guidelines.

A guide to managing the older person immediately after a fall is provided in Table 22.1. This can be used to inform the relevant hospital policy.

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Table 22.1: Managing the older person immediately after a fall

Managing the older person immediately after a fall
Offer basic life support and provide reassurance
Check for ongoing danger.
Check whether the older person is responsive (e.g. responds to verbal or physical stimulus).
Check the older person's airways, breathing and circulation.
Reassure and comfort the older person.
Take baseline measurements
Conduct a preliminary assessment that includes taking baseline measurements of pulse, blood pressure, respiratory rate, oxygen saturation and blood sugar levels. If the older person has hit their head, or if their fall was unwitnessed, record neurological observations (e.g. using the Glasgow Coma Scale).
Check for injuries
Check for signs of injury, including abrasions, contusions, lacerations, fractures, and head injuries.
Observe for changes in the level of consciousness, headache, amnesia or vomiting.
Safely move the older person
Assess whether it is safe to move the older person from their position and identify any special considerations in moving them. Staff members should use a lifting device instead of trying to lift the older person on their own. Follow the hospital's policy or guidelines on lifting.
Monitor the older person
Carefully observe older people who have fallen and who are taking anticoagulants or antiplatelets (blood-thinning medicines) because they have an increased risk of bleeding and intracranial haemorrhage. Older people with a history of alcohol abuse may be more prone to bleeding. Contact the medical practitioner and provide relevant details.
Ensure ongoing monitoring of the older person because some injuries may not be apparent at the time of the fall. Ensure hospital staff are aware of the type, frequency, and duration of the required observations.
Report the fall
Report all falls to a medical practitioner, even if injuries are not apparent.
Document all details in the older person's medical record, including their observations, appearance or response; evidence of injury; location of the fall; which medical practitioner was notified; and actions taken.
Complete an incident reporting form for all falls, regardless of where the fall occurred or whether the older person was injured.
Note any details of the fall when reporting the incident, including any recollections of the older person. At a minimum, this should include the location and time of the fall, what the older person was doing immediately before they fell, the mechanism of the fall (e.g., slip, trip, overbalance, dizziness), and whether they lost consciousness or experienced a conscious collapse.

22 Post-fall management

Managing the older person immediately after a fall
Discuss the fall and future risk management
Inform all relevant staff, family, and carers that the older person has fallen and is at an increased risk of falling again.
At the earliest opportunity, notify the person nominated to be contacted in case of an emergency.
Discuss the circumstances of the fall with the older person, its consequences and actions planned to reduce the risk of falling again. Involve the older person's carers and family (to the extent the older person chooses).
Assume that once an older person has fallen, they automatically have a higher risk of falling again until they have been assessed.
Follow local guidelines for identifying older persons as being at increased risk of falling.

22.3 Comprehensive assessment after a fall

All older people who fall require a comprehensive assessment in addition to a new fall risk assessment. If necessary, refer the older person to a specialist medical practitioner such as a geriatrician or to a falls clinic (see 5.3.4 Falls clinics).[462]

Post-fall assessments are part of successful multifactorial interventions for reducing falls and harm from falls. A comprehensive fall assessment includes:[462]

- taking a history of the older person's fall circumstances, medicines, acute or chronic medical problems, and mobility levels
- examining the older person's vision, gait and balance, and lower extremity joint function
- examining the older person's basic neurological function, including mental status, muscle strength, lower extremity peripheral nerves, proprioception, reflexes, and testing cortical, extrapyramidal and cerebellar function
- assessing the older persons' basic cardiovascular status, including heart rate and rhythm, postural pulse and blood pressure and, if appropriate, heart rate and blood pressure responses to carotid sinus stimulation.

22.4 Post-fall follow-up

After an immediate follow-up on a fall involving an older person, the cause of the fall and any related injuries should be investigated and reported. The fall investigation needs to consider environmental, social and clinical causes, including medicines, which may have contributed to the older person falling so these can be addressed to reduce the risk of another fall.

The following elements form part of best practice post-fall activities and should be reflected in a hospital's falls policy or practice guidelines:

- Consider a medicines review with a structured tool to detect medicines that increase fall risk and identify target medicines for deprescribing.
- Investigate the cause of the fall, including assessing the older person for delirium.
- Review the implementation of existing fall prevention strategies, including standard fall prevention interventions for older persons.
- Conduct a fall risk assessment (see Chapter 6), as new fall risk factors may be present in the older person.

- Implement a targeted, individualised plan for daily care for the older person based on the findings of the fall risk assessment tool. Multifactorial interventions should be carried out as appropriate to address the fall risk factors. This may include, but is not limited to, gait, balance and exercise programs, footwear review, medicines review, hypotension management, environmental hazard modification and cardiovascular disorder treatment.
- Encourage the older person to resume their normal level of activity. Many older people are apprehensive after a fall, and the fear of falling is a strong predictor of future falls.[463]
- Consider the use of fall injury-prevention interventions for the older person. For example, the medical practitioner may consider the use of hip protectors and vitamin D and calcium supplementation (see Chapters 19 and 20).
- Consider investigations for osteoporosis in older people in the presence of minimal trauma fractures (see Chapter 21).
- Ensure the effective communication of fall risk assessment and management recommendations to the multidisciplinary team and the older person and their carers and family (to the extent the older person chooses).
- At transitions of care, ensure communication of any falls or identification of fall risk with all relevant members of the multidisciplinary team, as well as the older person's carers and family (to the extent the older person chooses).

22.4.1 Analysing the fall

The type and level of investigation that a fall warrants is determined by the severity or harm rating allocated to a fall. All incidents with the highest severity rating should undergo an in-depth and detailed investigation, sometimes called a root-cause analysis. The main goal of the investigation is to assess the hospital's system in managing the older person's care.[9] The patient and their carers and family should be partners in the investigation.

Mandatory reporting to the state coroner

In some states and territories, a fall in a hospital that results in death must be reported to the state coroner. Each hospital should have a fall review process in place and follow state, territory and hospital policies.

Professional misconduct

If an investigation reveals that professional misconduct or unsatisfactory professional conduct was involved, this should be managed in accordance with local performance management processes, state-based legislation, and registration requirements.[9]

22.4.2 Assessment and training for rising from the floor after a fall

Assessment of ability to rise from the floor

After an older person experiences a fall, it may be useful to assess the ability of the older person to rise from the floor. It is important to reduce the risk of a 'long-lie' occurring due to the associated poor outcomes such as pressure ulcers, dehydration and pneumonia that can occur.[13]

Note that it is inappropriate to assess older people who are frail and have multiple comorbidities for their ability to rise from the floor given their already high fall risk.[464]

The Floor Transfer Test is a valid and reliable measure for assessing a person's ability to rise from the floor.[465, 466] It involves asking a person to perform a transfer from standing to a supine position on the floor and then return to a standing position with and without the use of a chair.

Training for rising from the floor

The Backward Chaining Method is a training program that has been shown to improve a person's ability to rise from the floor unassisted.[467, 468] It breaks down the movements of a floor transfer into small individual components and then performs them in the reverse order (standing-to-lying) to reduce the person experiencing failure in each component.

22.4.3 Loss of confidence after a fall

A common but often overlooked consequence of a fall by an older person is a loss of confidence in walking or a fear of falling, [3] which can occur even in the absence of injury. After a fall, hospital staff should observe the older person to note any changes in their usual activity that might indicate the presence of, or an increase in, fear of falling. Speak to the older person about any concerns they may have about falling.

Common approaches to improving loss of confidence or fear of falling by older people in hospital settings include participating in a balance and mobility training exercise program or wearing hip protectors.[469]

22.5 Reporting and recording falls

No blame culture

Accurate reporting of falls is supported in workplaces where there is a 'no blame culture'. Staff may feel anxious when completing an incident form and can associate the incident with feelings of guilt and blame. For accurate reporting of falls, hospital leaders must promote incident reporting as part of the quality improvement process rather than using it as a punitive tool to identify potential staff negligence. This requires a fair and just culture for achieving safe and high-quality care.

Quality data informs quality care

For high-quality care and effective risk management, information about falls must be collected and collated to monitor the incidence and patterns of falls, identify ways to prevent further falls and provide feedback on the effectiveness of fall prevention programs.

Any data collected should be used to inform changes in hospital practice aimed at reducing fall rates in older people. This requires regularly analysing collected data, monitoring trends, comparing fall data with that from other hospitals, and making changes to usual care based on the findings.

Share information with hospital staff

As part of ongoing education on fall prevention for hospital staff, the hospital should provide regular monthly feedback to staff on local rates of falls and severe injuries, as well as other fall trends data, so these can be discussed and addressed as part of routine, continuous quality improvement.

22.5.1 Minimum dataset for reporting and recording falls

A minimum dataset should be collected for all falls to facilitate reporting, reviewing, and improving the safety and quality of care for older persons. Items to be included in a minimum dataset should be determined by each hospital or organisation.

Table 22.2 provides an example of the types of information that can be included in a dataset for reporting and recording falls. This information should be completed whenever a fall or near miss occurs in a hospital.

Table 22.2: Minimum data set items for reporting and recording falls in hospitals

Minimum data set items
The older person's current and relevant diagnoses or problems
The date, time and place of the fall
Type of fall (e.g. slip, trip, bumping into or falling on an object)
The older person's activity at the time of the fall (e.g. attempting to stand or walking)
Whether the older person depends on aids or the staff to mobilise
Relevant information about clothing, footwear, eyewear and mobility aids used at the time of the fall
Any restrictive practices in use and if the older person has a behaviour support plan in place
Any recent changes to the older person's medicines that might be associated with fall risk
Any staff supervision provided at the time of the fall
Factors contributing to the fall, such as environmental conditions (e.g. floor, lighting, clutter) or staffing levels
The older person's health status following the fall (e.g. baseline observations, injuries)
Interventions to be implemented following the fall and necessary clinical treatment
The older person's perception of the fall, including the description of any preceding sensations or symptoms and what they consider could have prevented the fall
Any witnesses to the fall
Any other comments.

Fall-specific incident form

A generic incident form may already be in use; however, hospitals may need to develop a fall-specific incident form to focus on the details required to monitor fall incidences and management plans. Any of this information not already being collected can be captured by incorporating it into existing incident reports.

To obtain the most accurate information about the incident, the space in the form requesting a description of the fall should allow for free text. There should be room on the incident form for additional comments to be made.

Hospital staff should be encouraged to complete all sections of the incident report to minimise missing information when a fall is being reviewed.

Additional information

- The Royal Australian College of General Practitioners, RACGP Aged Care Clinical Guide (Silver Book). Part A Falls, 5th edition.
- Australian Commission on Safety and Quality in Health Care. Principles for safe and high-quality transitions of care.

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Appendices

Appendix 1: Acknowledgements

The Australian Commission on Safety and Quality in Health Care (the Commission) acknowledges the diligent work of the authors, reviewers and contributors listed below in researching and updating the Falls Guidelines.

The Commission thanks its Aged Care Advisory Group, the Australian Government Department of Health and Aged Care, the Aged Care Quality and Safety Commission and key stakeholders who provided advice and support for this work.

The significant contribution of the 2009 Falls Guidelines Review Expert Advisory Group in the development of the original Falls Guidelines published in 2009, as listed in Appendix 2, is also acknowledged.

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Critical review generously provided by:

Professor Jacqueline Close, Professor Vasi Naganathan, Dr Morag Taylor, Dr Daina Sturnieks, Professor Markus Seibel, Professor Ian Cameron, Professor Anne Tiedemann, Professor Kim Delbaere, Professor Keith Hill, A/Professor Cathy Said, Mrs Beryl Logie (consumer representative).

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Appendices

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Appendix 3: Methodology, systematic review and meta-analysis

Guideline methodology

Detailed information on the methodology used to develop the *Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines for Australian Hospitals* is provided below, including discussion on the analysis of evidence in identifying current best practice in preventing falls and harm from falls in older people in hospital.

The information is presented in line with the chapters of the Falls Guidelines.

Background

During 2021 and 2022, the Australian Commission on Safety and Quality in Health Care (the Commission) engaged Neuroscience Research Australia (NeuRA) to undertake a systematic review and meta-analysis of international evidence from intervention trials in hospital settings with falls and/or falls injuries outcomes to inform these Guidelines, as an update of the 2009 Falls Guidelines.

To summarise these trials, NeuRA undertook a systematic review and meta-analysis in November 2022 using the methods from the relevant Cochrane Collaboration review, [1] and accessed the update of this review submitted to Cochrane in March 2024.

Definition of evidence

These guidelines were developed using the principles of evidence-based practice, which is the process of integrating clinical expertise and the preferences and values of the older person with the results from clinical trials and systematic reviews of the medical literature. [2] This approach also involves avoiding interventions that are shown to be less effective or even harmful.

Expert Advisory Group

To guide and provide advice to the project, an expert panel comprising members of the Australian and New Zealand Falls Prevention Society was established in 2022. This included specialists in the areas of fall prevention research, measurement and monitoring, and quality improvement, as well as health professionals from fields, including geriatric medicine, allied health and nursing. When necessary, the expert panel accessed resources outside its membership.

Risk factors and interventions

Literature searches were carried out with the aim of identifying the highest quality information for each intervention (systematic reviews, particularly Cochrane reviews, meta-analyses and randomised controlled trials). This is in line with recommended methods for evidence-based practice, where answers to clinical questions are needed quickly based on rapid identification of the best quality literature. The information retrieved in this way was checked and supplemented by information from the extensive personal research databases of the clinical experts.

Evidence-based recommendations

The recommendations in these updated Falls Guidelines build on the recommendations included in the 2009 Falls Guidelines and are informed by the World Falls Guidelines. [3] For the 2024 edition the recommendations were developed by the authors based on updated evidence reviews with two rounds of input from the broader group of expert clinicians and researchers as outlined above.

Each recommendation is provided with a level of evidence from the modified GRADE system with '1' indicating a strong recommendation, '2' indicating a conditional recommendation, and 'A-C' indicating high, intermediate and low quality evidence respectively.

Where there was insufficient evidence from high-quality studies with falls outcomes to justify a recommendation, good practice points were developed for care initiatives and fall prevention interventions that the expert advisory group and authors considered likely to be beneficial.

Appendices

Good practice points

Good practice points were developed by the expert advisory group and authors based on current practice and a review of the literature discussed in the text of each section.

The good practice points in these updated Guidelines build on the 2009 Falls Guidelines and are informed by the World Falls Guidelines. [3] The good practice points were developed by the expert advisory group and authors based on multidisciplinary expert opinion and relevant literature. In areas where no studies with falls as an outcome are available, good practice points have been developed to enhance understanding of and/or evaluate the management of risk factors for falls in older people. Additional good practice points have also been included based on feedback from consultation.

Consultation

For this 2024 edition, the consultation process undertaken by the authors involved seeking feedback from leading clinicians and researchers in falls and fractures through the Australian and New Zealand Fall Prevention Society and the National Health and Medical Research Council (NHMRC)-funded Centre of Research Excellence in the Prevention of Falls Injuries.

Consultations conducted by the Australian Commission on Safety and Quality in Health Care, the Australian and New Zealand Fall Prevention Society, and the NHMRC Centre of Research Excellence in the Prevention of Falls injuries received feedback from multidisciplinary researchers, clinicians, professional organisations, and consumers.

Feedback was provided by the Commission's Aged Care Advisory Group, the Australian Government Department of Health and Aged Care, the Aged Care Quality and Safety Commission and key stakeholders (see Appendix 1).

Systematic review and meta-analysis

An update of the Cameron 2018 Cochrane Collaboration review of RCTs of interventions for preventing falls conducted in hospital settings was undertaken[1]. [1] Thirteen new trials with data suitable for meta-analysis of falls outcomes were included[2]. Thus, findings from a total of 37 trials were considered in this summary. Trials providing education interventions, whether to staff or older people, were pooled rather than separated as per ProFaNE criteria. Two trials examining disinvestment in fall risk assessment scoring instruments were included, despite having a mean age of 60 to 65, due to the high applicability of the trial settings, which were conducted in Australian hospitals.

A complete list of trials that met the inclusion criteria for the search update is provided in Supplement 3A; supporting meta-analyses and Forest plots are provided in Supplement 3B; a full reference list for Appendix 3 is provided in Supplement 3C.

The key interventions with evidence for effectiveness for fall prevention in hospitals are summarised below.

Education

Pooled data from 3 trials providing education interventions (educating staff and/or older people on fall prevention) demonstrated that this approach reduces the rate of falls (0.74, 95%CI 0.56 – 0.97; 4327 participants; 2 studies, 3 intervention groups; I2 = 0%) and risk of falling (0.62; 95%CI 0.44 – 0.86; 3028 participants; 3 studies, 4 intervention groups; I2 = 35%).

1 The update includes searches in MEDLINE, Embase and CINAHL to December 2021, using the key inclusion criteria and analysis methods as Cameron et al, 2018. The update does not include conference abstracts, non-English language articles, ongoing studies or trial registry records. Author contact was only undertaken in some instances. Only studies reporting data suitable for meta-analysis were included.

2 Studies with zero falls in either arm were excluded from the meta-analysis but listed in Appendix A.

Appendices

Social Environment Change

A number of different interventions involving changing the social environment (organisational services model changes) are examined in the included trials; the majority are studied in single trials.

Geriatric orthopaedic service for post-operative hip fracture care.

A single trial (199 participants) compared post-operative care in a ward providing a multidisciplinary comprehensive ortho-geriatric service, including assessment, management and rehabilitation with usual care in an orthopaedic ward following surgery for hip fracture and reduced the rate of falls (RaR 0.38, 95% CI 0.19 to 0.74) and risk of falling (RR 0.41, 95% CI 0.20 to 0.83) at discharge.

Scored risk assessment tools

Two studies (with a mean age of 60-65 years) demonstrated that using scored risk assessment tools probably increased falls compared to falls assessment and intervention only (RaR 1.24, 95% CI 1.07–1.43; 138,389 participants; 2 studies; I^2 = 0%; moderate certainty evidence). These trials undertook disinvestment from the scoring components of the assessments, with careful monitoring of falls rates during the stepped wedge trials.

Multifactorial interventions

Multifactorial interventions in hospitals probably decrease falls; however, the confidence intervals include both a decrease and an increase in falls (RaR 0.86, 95%CI 0.68 – 1.08; 41543 participants; 4 studies; I^2 = 48%; Low certainty evidence; RR 0.82, 95%CI 0.62 – 1.07; 40602 participants; 4 studies, I^2 = 0%; Moderate certainty evidence).

Exercise, cognitive behavioural modification and education

One trial (N=96) examined a multicomponent intervention involving cognitive behavioural modification, communication, exercise and education delivered through 8 additional individual sessions during inpatient rehabilitation. It demonstrated a significant reduction in the rate of falls (RaR 0.17, 0.04 – 0.74) and the risk of falling (RR 0.20, 0.05 – 0.82). However, due to the extremely small number of events (total of 12 fallers), the effect of this intervention is considered uncertain (very low certainty evidence).

Exercise

Pooled data from 2 studies of additional physiotherapy delivered in hospitals showed a reduction in the risk of falling (RR 0.36, 95% CI 0.14 to 0.93; 83 participants, 2 studies; I^2 = 0%; very low certainty evidence). There was no strong evidence of a reduction in the rate of falls (RaR 0.59, 95% CI 0.26 to 1.34; 215 participants, 2 studies; I^2 = 0%; very low certainty evidence). However, there was an extremely small number of total events.

CONCLUSION: We are uncertain of the effectiveness of providing additional physiotherapy in rehabilitation settings for fall prevention as the certainty of the evidence is very low.

Additional discussion of evidence for fall risk factors

Education

Providing education to hospital staff and/or older people on fall prevention reduced the rate of falls by 26% (0.74, 95%CI 0.56 – 0.97; 4327 participants; 2 studies) and the risk of falls by 38% (0.62; 95%CI 0.44 – 0.86; 3,028 participants; 3 studies). These findings are based on three large randomised-controlled trials (RCT),[4-6] two of which were conducted in Australia:

Appendices

Cluster RCT results

A cluster RCT involving over 3,600 older people conducted in eight hospital rehabilitation units demonstrated that education for older people provided in addition to usual care to older people with better cognition (approximately 50% of the wards in the RCT) reduced falls and injurious falls in rehabilitation wards.[6] Older persons' education was individualised and based on the principles of health behaviour change. Staff were provided with feedback from older people and trained to support the various strategies taught to older people in the intervention group. The program raised older people's awareness of their risk of falls and increased their confidence in using their call bells to seek assistance from staff.

Three armed RCT results

Another large three-armed RCT (n=1,206) found that the program, which included both education material and health professional follow-up, was the only effective education program in reducing falls in the sub-set of older people with intact cognitive function. [5] Set in acute and sub-acute hospital wards, the RCT tested the effectiveness of providing:

- a multimedia older person education program based on the health-belief model combined with trained health professional follow-up, and
- the multi-media education materials for older people without trained health professional follow-up, versus
- usual care (control).

Disinvestment from fall risk assessment scoring

Two studies demonstrated that using scored hospital risk assessment tools probably increased falls in comparison to fall risk assessments that do not calculate summed fall risk scores (RaR 1.24 95%CI 1.07 – 1.43; 138,389 participants; 2 studies).[7,8]

Social environment change

A single trial of a multidisciplinary comprehensive ortho-geriatric service, including staff education, multidisciplinary care planning, investigation, screening and treatment of delirium and pain, in older people admitted for femoral neck fractures reduced the rate of falls (RaR 0.38, 95% CI 0.19 to 0.74) and risk of falling (RR 0.41, 95% CI 0.20 to 0.83) compared with usual care at discharge. [9]

Exercise

Three studies compared the effectiveness of providing additional exercise in hospitals versus usual physiotherapy. [10-12] Pooled data showed a reduction in the risk of falling (RR 0.36, 95% CI 0.14 to 0.93; 83 participants) [10,11] but no strong evidence of a reduction in the rate of falls (RaR 0.59, 95% CI 0.26 to 1.34; 215 participants).[10,12]

However, these findings, which provide low evidence of the effectiveness of providing additional physiotherapy in rehabilitation settings, must be interpreted with caution due to the small sample sizes and number of falls recorded.

Multifactorial and multiple interventions

The meta-analysis demonstrated that multifactorial interventions probably reduced falls in hospitals. The multifactorial interventions from five large RCTs [13-17] included varying combinations of supervised exercise and balance training, education, medicines review, vitamin D with calcium supplementation, environmental review, walking aids and hip protectors and were conducted in both acute and sub-acute wards. These trials include:

- an RCT that used a screening tool in each older person's notes to prompt recommendations for four basic interventions by referring to allied health staff. [13] This multifactorial intervention, which was undertaken in an Australian population, reduced the incidence of falls in the subacute hospital setting

- an RCT conducted in acute and rehabilitation wards that applied interventions similar to those in other RCTs using dedicated multidisciplinary research staff over a three-month period. [14] It was the largest study to date and undertaken in an Australian population. The rates of falls in this study were not reduced. This may have been because: [14]
  - ☐ the intervention was too short or not sufficiently intense
  - ☐ the use of external staff meant that regular hospital staff did not change their practice to maintain the interventions out of hours
  - ☐ some interventions, such as exercise programs, most likely required longer than a seven-day period to improve outcomes.

Another small multiple intervention program (n=96) involving cognitive behavioural modification, communication, exercise and education delivered through eight additional individual sessions during inpatient rehabilitation demonstrated a significant reduction in the rate of falls (RaR 0.17, 0.04 – 0.74) and the risk of falling (RR 0.20, 0.05 – 0.82). However, due to the small number of events (total of 12 fallers), the effect of this intervention is considered uncertain (very low certainty evidence).[17]

Environmental factors

Despite environmental factors such as lighting, flooring, fitting and signage being likely contributors to falls, [17,19] they have not been evaluated as main interventions of RCTs undertaken in hospital. In addition, there is inconclusive evidence regarding the use of non-slip socks for fall prevention in hospitals. [20] Low beds have also been found to be ineffective, [21] but some multifactorial interventions have involved monitoring of older peoples' bedside environment for safety. [22]

Individual monitoring

There is evidence that bed alarms do not reduce falls in older people when in hospital. [22-24] There is also very low-certainty evidence that providing sitters, that is, older persons' companions who provide supervision of high-risk older people, reduces falls. [25]

Although not formally evaluated in an RCT, older persons' call bells are essential to multifactorial fall prevention programs because they reduce the likelihood of older people mobilising unassisted. Therefore, it is crucial to educate older people on the correct use of call bells, and how and when to ring them.

Medicines review

Despite limited evidence of the effect of medicines review as a single fall prevention intervention in hospitals and a lack of inclusion of these interventions in multifactorial approaches, reductions in prescriptions of psychoactive medicines can significantly reduce fall rates in older people. [26]

The success of fall prevention interventions may be influenced by the existing interventions in place, the level of organisational reinforcement or support, and the duration of the intervention. Interventions that last for only a few months may not be long enough to change the organisational culture.

Appendices

Chapter 5. Fall prevention interventions

Discharge from the emergency department

Approximately 43% of older people presenting to an emergency department after a fall are not admitted to hospital. [27] An observational study from the United Kingdom found that older people have an increased risk of subsequent hospitalisation and even death, [28] and 6% will return to the emergency department after another fall within 24 hours. [29] One-fifth of the older people who present with minor injuries and who are not admitted to hospital are at risk of ongoing functional decline for up to three months after discharge. [29] There is evidence that an older person will have an elevated risk of further falls if they have experienced a fall, were unable to get up independently, and have a history of previous falls. [30] In addition, older people presenting to the emergency department with other issues may also be unsteady and at risk of future falls and fall-related injuries. There is some evidence that multifactorial interventions planned at discharge from the emergency department are effective in preventing falls once the older person is back at home. [30,31]

An RCT in the United Kingdom investigated a structured, interdisciplinary fall assessment for older people requiring emergency department care. The assessment, which included a medical and occupational therapy assessment and referral to appropriate services, was associated with a significant reduction in risk of further falls in the intervention group compared with usual care. [32] Table 6.2 lists the details of the PROFET - the assessment tool recommended in this study. A study of a similar intervention demonstrated a 36% reduction in falls during follow-up. [33]

More recently, the Australian RESPOND trial involved older people aged 60 to 90 years presenting to the emergency department with a fall and planned for discharge home within 72 hours. [31] The intervention – which included a home fall risk assessment, along with six months of telephone-based education (coaching, goal setting, and support for evidence-based risk factor management), and linkages to existing services – significantly reduced falls by 35% compared to usual care. Although the program also reduced fracture rates, these events were rare, and there was no statistically significant effect on other fall injuries, fall risk, falls efficacy, quality of life, or the number of subsequent presentations to emergency or hospitalisations.

Chapter 6. Fall risk assessment for tailoring interventions

Research into the effectiveness of fall risk screening

One step-wedged RCT conducted in Australia examined whether discontinuing a scored fall risk screening tool would have an impact on fall rates in acute and sub-acute ward older people. [34] For this study, all older people underwent an admission risk screen that included mobility impairment, cognitive impairment and recent falls screening items throughout the 10-month trial period. In the 'discontinuance' trial periods, older people did not undergo an additional scored screen – The PHFST. Older people in the 'continuance' trial phase who scored at high or medium risk of falls on the PHFST and older people in the 'discontinuance' trial phase who scored positively on one of the items in the admission risk screen underwent a full fall risk assessment. In both phases, clinical judgement by nursing staff was also used to identify older people considered to warrant a full fall risk assessment. The main findings were that the omission of the additional scored screen did not significantly alter fall rates over an average period of five months. The omission of the additional scored screen saved staff 36 seconds per older person in completing the paperwork.

Taken together, these findings suggest that screening tools, the use of a list of established fall risk factors and clinical judgment can assist in triaging older people for further fall risk assessment [7], and that calculating a fall risk score is not necessary.

Research into the effectiveness of fall risk assessment tools

The authors of the systematic review concluded that no existing fall assessment tool could be recommended for implementation across all hospital settings. Instead, they suggested that better, validated fall risk assessment tools were needed in hospital settings, or a different approach is needed for identifying common, modifiable risk factors in all older people and ensuring an appropriate post-fall assessment for those who do fall in hospital. [35]

Five randomised trials have included fall risk assessments as part of multifactorial fall prevention interventions in the hospital setting. Falls were reduced in three of these trials, [16,9,13] and were unchanged in two. [36]

Discontinuing fall risk assessment tool

A recent cluster randomised controlled trial (RCT) has examined whether discontinuing a scored fall risk assessment tool would impact fall rates in 10 Australian private hospitals. [8] For this study, five hospitals were randomised to a "continuance" arm in which a scored fall risk assessment tool (with unknown psychometric properties) continued to be used. The score ranged from 1 to 10 based on 10 fall risk factors and was used to categorise older people as low, moderate, or high risk of falls. Hospitals randomised to the "disinvestment arm" used a very similar fall screen without summing the risk factors to calculate a risk score. The main findings were that the omission of risk factor scoring did not significantly alter the hospital fall rates of older persons over three months. No data were presented regarding whether the time taken for the two assessment approaches differed.

Chapter 7. Balance and Mobility

A systematic review based on Cochrane Collaboration methods undertaken for these guidelines included 37 trials, including 13 new since the 2018 Cameron Cochrane review, [1] with data suitable for meta-analysis of fall outcomes. Three studies compared the effectiveness of providing additional exercise in hospitals versus usual physiotherapy. [37,11,12] Pooled data showed a reduction in the risk of falling (RR 0.36, 95% CI 0.14 to 0.93; 83 participants; 2 studies)[37,11] but no strong evidence of a reduction in the rate of falls (RaR 0.59, 95% CI 0.26 to 1.34; 215 participants, 2 studies).[37,12] However, these findings, which provide low evidence of the effectiveness of providing additional physiotherapy in rehabilitation settings, must be interpreted with caution due to the small sample sizes and the number of falls recorded.

One trial, which included 96 older people in a geriatric rehabilitation unit, examined a multi-component intervention involving cognitive behavioural modification, communication, exercise and education delivered through eight additional individual sessions during inpatient rehabilitation. [38] The intervention led to a significant reduction in the rate of falls (RaR 0.17, 0.04–0.74) and the risk of falls (RR 0.20, 0.05–0.82). However, due to the extremely small number of events (a total of 12 fallers), the effect of this intervention is considered uncertain.

Subacute hospital settings

In subacute hospital settings with lengths of stay of at least three weeks, one RCT showed that an intervention including exercise, education, fall risk alert cards and hip protectors in addition to usual care reduced fall rates by 30% (rate ratio=0.70, 95%CI 0.55 to 0.90).[13]

Acute aged care and short-stay subacute settings

Acute aged care and short-stay subacute settings have an average stay of one week. A recent Cochrane review reported that exercise programs for older people during an unplanned hospital stay may benefit functional mobility. The review also

concluded that these exercise interventions did not increase the risk of falls for older people when they were in hospital. [39]

A cluster randomised trial found that, when delivered in addition to usual care, multifactorial programs that include exercise did not prevent falls (incidence rate ratio=0.96, 95%CI 0.72 to 1.2842).[14] This was despite providing an additional 25 hours a week of nursing and physiotherapist time.

There are many challenges in conducting randomised trials of hospital fall prevention programs in short-stay wards, including the need for many participants to ensure randomisation. Widespread adoption of fall prevention programs is also needed, which can make it difficult to have control wards. [40]

Discharge planning and exercise

A Cochrane review showed that well-designed exercise programs can prevent falls in older people who live in the community. [41] Therefore, it makes sense that when older people leave hospital, referrals should be made for ongoing exercise programs.

Only limited research has been conducted to directly evaluate the effect of such a strategy on falls. An RCT of a 12-month home exercise program significantly increased the rate of falls in older people recently discharged from hospital despite improving their mobility.[42] There is a need for more research to determine the optimal type of delivery and form of fall prevention intervention in this high-risk, frail population. Multifactorial programs, including exercise and interventions to address safety delivered by an occupational therapist and self-efficacy via cognitive-behavioural therapy, warrant investigation.

Assessing balance, mobility and strength

Several studies have evaluated these aspects of tools for use in the older population and older people receiving rehabilitation [43] and acute medical care. [44] Some preliminary work has developed methods for evaluating balance assessment tools in fall prevention programs. [45]

Chapter 8. Cognitive impairment

Two hospital-based RCTs that evaluated screening or assessment as part of a multifactorial fall prevention program included participants with and without cognitive impairment. [15,13] The trials found that the intervention reduced falls across the full sample.

Another RCT assessed a multifactorial fall prevention program in older people after surgery for hip fracture. [9] The trial found a significant reduction in falls in a subgroup analysis of those participants with dementia.

Chapter 9. Medicines

Cardiovascular medicines

Antihypertensive medicines have been associated with an increased risk of serious fall injuries, particularly in those with previous injurious falls. [46] There is conflicting evidence on whether higher doses of antihypertensive medicines lead to an increased risk of falls. One cohort study of 60- to 86-year-old people found that antihypertensive medicines were independently associated with falls in older people, particularly those with a history of previous stroke. [47] However, another cohort study of people aged 70 years and over found that higher doses were not associated with an increased risk of falls. [48] Thiazides have been found to increase fall risk, particularly in the 3 weeks following the first prescription .[49] The risk of hip fracture may also be increased with the use of antihypertensives in the first 7-45 days following prescription. [50,51] A Cochrane review found that thiazides appear to reduce the risk of hip fracture, but more research is needed to confirm this finding. [52]

Appendices

Anticonvulsant medicines

Antiepileptic medicines are associated with an increased risk of falls; however, studies have not used a clear definition to ensure that results directly from seizures were excluded. [53] There is conflicting evidence regarding the risk of falls and the use of anticholinergic medicine. One longitudinal study found no significant association between anticholinergic medicine use and recurrent falls. [54] A cohort study found a significant association between anticholinergic medicines and injurious falls [55] and a systematic review and meta-analysis found anticholinergic medicines were associated with increased risk of falls, as well as cognitive impairment and all-cause mortality in older people. [56]

Polypharmacy

A study of community-dwelling men aged 70 years and over found that the use of five or more medicines was significantly associated with adverse effects on frailty, disability, mortality and falls. [57]

Polypharmacy, including regular antidepressant or benzodiazepine use, has been found to be associated with increased fall risk in community-dwelling people aged 50 years and over. [58]

Multiple medicine use may be partly a proxy measure for poor health. Findings of one cross-sectional study of women aged 60–79 years visiting their general practitioner did not support a strong relationship link between multiple medicine use and falls. The risk of falls increased with the number of medicines taken. However, once the number of chronic illnesses was adjusted for, the population-attributable risk associated with psychoactive medicine use was between 2% and 5%, compared with a 32% risk of having a chronic disease.[59]

Evidence for interventions

A recent systematic review and meta-analysis have evaluated the efficacy of medicines reviews for preventing falls in older people in hospital settings.[60] The main findings were that medicine reviews did not significantly reduce the number of fallers either during (RR = 0.50, 95% CI=0.07-3.50, 2 studies) or after (RR = 0.97, 95% CI=0.74-1.28, 2 studies) admission. The authors concluded that the considerable variation of the interventions precluded an estimate of the exact effect of medicines review and deprescribing as a single intervention. Nonetheless, they suggested these interventions should not be implemented as a stand-alone fall prevention strategy but rather be included in multimodal strategies due to the multifactorial nature of falls.

One RCT reviewed medicines as part of a multifactorial intervention for older people in hospital with a history of falls.[16] As part of the intervention, suspect medicines (including sedatives, antidepressants and diuretics) were evaluated, as well as multiple medicine use. The intervention included a medical review of prescribed medicines associated with increased fall risk. Compared with a control group, older people who were screened using the multifactorial risk-factor prevention plan had a significant reduction in the risk of falls. Therefore, addressing medicines history is effective when combined with other risk-reducing interventions.

Appendices

Chapter 10. Continence

Although it was initially thought that frequent rushed trips to the toilet to avoid incontinent episodes were the primary contributors to falls in older people with urinary incontinence, the need to concentrate on getting to the toilet while walking, akin to dual-tasking, is more likely a contributing mechanism according to recent expert consensus. [61] Regardless of continence status, older women's walking speed and stride width are reduced when experiencing a strong desire to void. [62] In addition, in a sample of 1942 community-dwelling women aged 75-85 years, poor motor and balance skills were strongly associated with urinary incontinence, proportional to the severity of incontinence and related specifically to urge incontinence. [63] These findings suggest that dysfunctional balance, gait and mobility may be potential mediators between urinary incontinence and falls. [62-64]

Urinary incontinence is associated with constipation in older, community-dwelling Australian women. [65]

However, it is difficult to make strong recommendations because specific continence-promotion strategies have not been part of successful fall prevention programs in any healthcare setting. [66] A practical, stepwise management approach for mobile and non-mobile older people, as well as older people with and without cognitive impairment, should be considered.

Chapter 11. Feet and footwear

A multifaceted podiatry intervention, including foot orthoses, advice and provision of footwear, home-based foot and ankle exercises and fall prevention education, was effective in reducing falls in community-dwelling older people with disabling foot pain. [67] In addition, fewer participants had a fracture resulting from a fall. Contributing factors likely included improvements in foot and ankle strength, range of motion, balance and functional ability.

The REFORM multifaceted podiatry intervention trial [68] delivered a modified version of the above randomised controlled trial (RCT) comprising foot and ankle strengthening exercises, foot orthoses, provision of new footwear if required and a fall prevention leaflet. This trial involving 1010 community-dwelling older people at risk of falling found a small, non-statistically significant reduction in the incidence rate of falls in the intervention group compared to usual care.

A pilot RCT evaluating a podiatry intervention involving 43 participants has also been conducted in the nursing care home setting. [69] This study found that it was feasible to deliver the interventions as 35% of participants in the intervention arm completed the exercise program, and 48% reported using the prescribed orthoses all or most of the time.

The evidence from multifaceted podiatry interventions and multifactorial interventions involving referral to podiatry as a fall prevention strategy has now been synthesised into a systematic review, [70] with the primary conclusion being that these interventions significantly reduce fall rates in community-living older people. There is also modest evidence from a systematic review (n = 8 articles) that foot and ankle exercise programs reduce the risk of falling in older people. [71]

Two systematic reviews have also synthesised findings in relation to footwear interventions and balance. One review (n=14 articles) found that footwear interventions, including shoe insoles and foot orthoses, can significantly facilitate balance and gait in people 60 years and older through a combination of mechanical and sensorimotor mechanisms, which may translate to the prevention of falls. [72] The second review and meta-analysis, which included data from seven studies, found that insoles improve standing balance and gait performance in older people, with vibration and textured insoles having the greatest effects. [73]

Appendices

Chapter 12. Syncope

Orthostatic hypotension is associated with an increased risk of falls; however, there are inconsistencies in results from studies evaluating the link. [74-77]

An RCT found a 70% reduction in falls among older people with accurately diagnosed cardioinhibitory carotid sinus hypersensitivity (CHS) who received cardiac pacing.[78] However, a follow-up randomised, double-blind, crossover, placebo-controlled trial found no effect on fall rates in older people with cardioinhibitory CHS who received cardiac pacing. [79]

There is limited evidence for currently used therapies to manage orthostatic hypotension due to the lack of high-quality, randomised, placebo-controlled trials.[80]

Chapter 13. Dizziness & Vertigo

A study of older people presenting with dizziness symptoms to an emergency department or directly admitted to a hospital found that stroke or transient ischaemic attack was diagnosed in only 3.2% of the sample and that the most common cause of vertigo and dizziness in this population was a benign peripheral vestibular dysfunction (33%).[581]

However, the association between vestibular dysfunction and falls remains unclear [82] as there is limited research in this area in the hospital setting.

A case-series study examined approximately 3,000 people who presented to a hospital emergency department after a fall. Sixteen per cent had no known cause for their fall. A vestibular symptom scale questionnaire completed by this group showed a high incidence of the symptoms of vestibular impairment (e.g. nausea, vomiting, dizziness).[83]

A study of 66 people found that older people who lived in the community and who had fractured their wrists because of an accidental fall were more likely to have vestibular asymmetry on testing than an age-matched group of non-fallers. [84]

Older people with BPPV often have balance problems; however, more research is needed to determine whether there is an association between BPPV and falling in older people. A cross-sectional study of 100 people found that 1 in 10 older people presenting to an outpatient clinic with a range of chronic medical conditions had undiagnosed BPPV, and these older people were more likely to have sustained a fall in the previous three months. [85]

Diagnostic tests for dizziness

A systematic review of diagnostic tests used to evaluate dizziness in primary care found that validation of commonly used diagnostic tests is poor and practice guidelines are based on opinion rather than evidence. [86] The review also found a lack of studies including older people, despite the prevalence of dizziness increasing with age.

Of the studies examined, only four tests had been evaluated in more than one study: the Dix-Hallpike manoeuvre, head-shaking nystagmus test, head impulse test and vibration-induced nystagmus. The head impulse test was the only test with evidence to support the diagnostic process in primary care, with a positive result diagnosing peripheral vestibular dysfunction and a negative result diagnosing central peripheral dysfunction.

One prospective cohort study was conducted in 417 older people, examining the 6-month prognosis of dizziness in older people in primary care. [87] The study found that easily obtainable clinical information could predict people with persistent dizziness-related impairment after 6 months. These factors included chronic dizziness, standing still as a dizziness-provoking circumstance, trouble walking or (almost) falling as an associated symptom, polypharmacy, absence of diabetes mellitus, having an anxiety or depressive disorder, and impaired functional mobility. A simple sum score of these seven factors identified individuals with an unfavourable course of dizziness, especially for sum scores of 4 and higher. Treating factors amenable to intervention, including anxiety and depression, polypharmacy and functional mobility, may be most effective for clinical management.

A simultaneous diagnosis- and prognosis-oriented approach for older people who experience dizziness may improve care for this group, even if a diagnosis is not available.[88] The Dizziness Handicap Inventory and seven-item sum score[89] could be used to identify if the older person is at risk of persistent impairment and modifiable predictors identified and treated. This could include:

- Impaired functional mobility – physical exercise or physiotherapy
- Comorbid anxiety – psychotherapy and/or anxiolytics
- Comorbid depression – psychotherapy and/or antidepressants
- Dizziness due to the psychiatric cause – psychotherapy and/or psychotropic medicines
- Inappropriate polypharmacy – tapered withdrawal of a medicine(s)
- Avoidance of dizziness-inducing situations – cognitive behaviour therapy.

A multifactorial approach – including assessments of cardiovascular conditions and medicines use, benign paroxysmal positional vertigo, anxiety and postural sway – might assist in tailoring evidence-based therapies to improve dizziness symptoms in middle-aged and older people.[90]

Chapter 14. Vision

There is limited research on specific visual interventions for preventing falls in hospitals. A systematic review[35] identified two studies using crude assessments of vision that reported visual impairment as an independent risk factor for falls[90] and in-hospital hip fracture.[91]

Diabetic retinopathy – results of independent studies investigating this are mixed. A systematic review included two studies that found no association between diabetic retinopathy and the risk of falling.[92] Another study found that individuals with mild or moderate diabetic retinopathy had significantly elevated odds of falling in comparison to older people with diabetes without diabetic retinopathy.[33]

Chapter 15. Hearing

Several studies have examined hearing impairment in relation to fall risk.[94,96-100] Most of the studies included large samples from longitudinal studies and were conducted in community settings. Some studies measured hearing impairments using audiometric measurements[94,97,100,101], whereas others based their hearing impairment measure on self-report.[96,98,99,102] As self-reporting underestimates hearing loss, the studies that measured hearing loss using audiometry are, therefore, likely to yield more valid results.[95] Some studies have used retrospective designs, basing their analyses on a single question about past falls (usually in the past year). Others have collected prospective falls following the hearing assessment, a preferred outcome measure in fall prevention trials due to its greater precision and reduced reliance on good memory.[103,104]

Four retrospective studies[99-102] and the prospective Finnish Twin study[94] found hearing impairment increased fall risk, whereas one retrospective study[9] and two large studies using prospective falls data did not find this to be the case.[97,98] Most studies performed analyses to adjust for a range of confounders (such as age, gender, cardiovascular risk factors, and diabetes) to determine whether there was an independent effect of hearing impairment and falls. However, many studies have been conducted in selected populations, which may not be representative of older people in the hospital setting. Although no meta-analysis has been undertaken, findings of studies to date indicate that hearing impairment contributes to falls in older people.

Fall prevention interventions

There have been no hearing improvement trials undertaken as a single fall prevention intervention, and strategies for improving hearing have not been included in multicomponent fall prevention trials.

Interventions to address the detrimental psychosocial and physical effects of hearing impairment in older age are lacking.

A pilot study conducted in a community setting in Canada demonstrated that a ten-week holistic program involving a combination of exercise, walking, and cognitive-behavioural therapy sessions was effective in improving loneliness and key measures of physical function, including lower limb strength, gait speed, and upper body flexibility, among 71 older people with self-reported hearing impairment. [105] In this study, participants were randomly allocated to a control group prescribed group audiological rehabilitation (n=31) or an intervention group (n=35) who received an exercise and socialisation/health education program in addition to the group audiological rehabilitation.

Chapter 16. Environment

A Cochrane review looked at the effectiveness of different interventions for preventing falls in older people in hospitals or nursing care facilities. The review found that multifactorial interventions targeting several different risk factors, such as fall prevention programs that include environmental modification as part of a suite of interventions, may help prevent falls in hospitals. [1] These multifactorial interventions appear to be more effective for older people who are at increased risk of falls (e.g., those with cognitive impairment, heart conditions and stroke)[106] and those with long hospital stays.

A cross-sectional study [107], albeit conducted in the community, found that the person-environment fit problem was a stronger determinant of falls in the past year than the number of environmental hazards alone. A prospective cohort study [108] showed how among older people receiving home-care services, those classified with poor to fair mobility experienced higher rates of recurrent falls. In this group, a 10% increase in environmental risk score was associated with a 23% increase in falls.

The Falls-HIT German trial [109] involved 361 older people with mobility limitations who had recently been discharged from a geriatric hospital. The intervention consisted of in-hospital and post-discharge home visits to assess the home, recommendations and training in the use of mobility aids, with an occupational therapist and, if indicated, a physiotherapist. At one year, the intervention group had 31% fewer falls than the control group, with subgroup analysis demonstrating it was particularly effective in those with a history of multiple falls.

In an RCT, the occupational therapist assessed the home for environmental hazards and facilitated any necessary home modifications, the most common being the removal of mats and throw rugs (48%), changing footwear (24%), and introducing non-slip bathmats (21%).[110] The authors suggest that the home visit from the occupational therapist likely also instilled behavioural change towards living more safely in the home and outdoor environment in this high-risk group of older people. [111]

Chapter 17. Monitoring & Observation

Technology

Observational studies have looked at technologies for reducing falls, such as infrared movement detectors, fall alarms (which sound when an older person is already on the floor), bed and chair alarms, and movement alarms. However, these studies are generally of poor quality. The 2018 Cochrane review on fall prevention interventions in hospitals reported that bed and chair sensor alarms did not reduce the rate or the risk of falls.[1] A single trial of organisational services model change identified in the update of the Cochrane review (see Appendix 2) showed no significant difference in hospital falls rate between participants receiving electronic surveillance system monitoring with a dedicated rounder or electronic surveillance system without a dedicated rounder. [112]

Flagging

A multifactorial trial in three Australian subacute hospital wards included a risk alert card by the bedside [13]. The researchers deliberately used a symbol, rather than words, on the A4-sized card to minimise violating privacy or causing distress to older people or their families. Throughout the study duration, no official complaints were received regarding the display of the alert card. Other components of the intervention included an information brochure, an exercise program, an education program and hip protectors. The incidence of falls in the intervention group was reduced compared with the control group.

Sitting programs

However, there is no strong evidence indicating that providing sitters reduces falls in acute hospital settings. [25] In a recent systematic review, two Australian studies provided very low-certainty evidence that adding sitters to usual care reduces falls. [113.114] One of these was a pre-test–post-test comparative study set in two South Australian hospitals, evaluating the effectiveness of using volunteer sitters in reducing falls. [114] Volunteers worked four-hour shifts between the hours of 9 am and 5 pm. No falls were reported at either hospital during the hours that volunteers were present. Volunteers maintained journals throughout the study, and the journals indicated high satisfaction with their roles. Semi-structured interviews with family members indicated high satisfaction with the volunteers. However, some nurses (n=7; 29%) reported that volunteers could be demanding of their time and required too much supervision.

The second Australian study looked at the effect of volunteer companion-observers in preventing falls in an acute aged care ward. [113] Older people were situated in a four-bedroom room/ bay if they were identified to have a high fall risk. Volunteers completed a minimum shift of two hours between 8 am and 8 pm on weekdays.

The key role of the volunteers was to alert nursing staff if an older person showed high-risk behaviours, such as becoming agitated or attempting to climb out of bed. After 20 months, no falls were reported in the observation room, and falls in the ward were reduced by 51%. Family members expressed satisfaction with the volunteers; however, the volunteers' role needed clarification, as nurses sometimes asked volunteers to walk or feed older people, and volunteers sometimes became frustrated if nurses were slow to respond to call bells from older people.

A limitation of volunteer sitters is that they are typically only available during 'business' hours. [113] Providing 24/7 monitoring coverage by volunteers would require an additional 15 volunteers per week in a hospital ward. [114]

Response systems

Response systems are usually a form of monitor, incorporating an alarm that sounds when an older person moves. Several response systems are commercially available. In some systems, an alarm is activated by a pressure sensor when an older person starts to move from a bed or chair.

An RCT of older people of a geriatric evaluation and treatment unit did not find any statistically significant difference between an intervention group (who received a bed alarm system) and a control group (who did not).[16] The 2018 Cochrane review on fall prevention intervention in hospitals [1] pooled data from two RCTs of bed exit alarms in hospital [116,117] and did not show a significant reduction in the rate or the risk of falls.

An Australian study conducted in 12 hospitals included alarms in a multifactorial fall prevention intervention. [14] Adherence was high: 40 of the 49 participants who were given the recommendation complied with wearing the alarm. The alarm was a pressure switch under the heel that, when stood on, activated a high-pitched sound, amplified by a speaker concealed in a pocket in the wearer's sock. The intervention did not affect fall rates, and the authors suggested that the median length of stay (seven days) was too short for interventions to take effect.

In other alarm systems, an alarm sounds when any part of an older person's body moves within a space monitored by the alarm. Yet another style of alarm activates when an older person falls but does not get up. Response systems require capital investment and rely on a third party (e.g., hospital staff or the older persons' carer) to respond when the alarm sounds. The issues of who responds, how they respond, and what impact this has on ward practice – including what it may take away from other areas of care – need to be considered before any system is implemented.

Risk management issues with alarms and response systems

Alarms may perceivably pose risk-management problems for hospitals in that failure to respond to an alarm due to a lack of staffing could be seen as a failure in care. Moreover, it is not necessarily correct to assume that if someone lacks mental capacity due to dementia, they should be subjected to intrusive monitoring to prevent falls. [118] Care should be taken that alarms do not infringe on autonomy. The lack of clear research results (probably due to the difficulties in researching this area) and the ethical and legal considerations of monitoring older people should be factored into decisions.

Automatic fall detection devices

A systematic review of wearable and non-wearable fall detection devices found that several devices can measure different aspects of a fall. However, there has been limited real-world testing of these devices, making it challenging to compare their accuracy. [119]

Another systematic review of body-worn sensors for fall detection also found that it was difficult to compare studies, as standardisation of measuring and reporting falls was needed, and there was a lack of real-world trials. [120]

One study performed a systematic comparison of thirteen published fall detection algorithms, testing them on a database of 29 real-world falls. The study found that algorithms successful at detecting simulated falls did not perform well in detecting real-world falls, resulting in a high number of false alarms. [121]

Smartphones attached to the waist could be a feasible and attractive option for older people for fall detection, with one study finding high specificity and sensitivity of fall detection compared with an independent accelerometer. [122] An external accelerometer attached to the waist and transmitting to the phone may provide a better alternative, with a less intrusive device attached to the user.

Chapter 18. Restrictive practices

A survey of UK medical wards found that rails were being used inappropriately as a restrictive practice for both confused older persons and those needing assistance to mobilise.[123] A Cochrane review of interventions designed to prevent healthcare bed-related injuries in older people found no significant increase or decrease in the rate of injuries with the use of low-height beds and bed exit alarms. [124]

An observational study from Finland recorded the use of psychoactive and other medicines as chemical restraints in long-term hospital care. The study found that, out of 154 participants, 33% received three or more psychoactive medicines regularly, and 24% received two or more benzodiazepine derivatives or related medicines regularly. The authors concluded that psychoactive medicines were used as chemical restraints in these long-term care wards. [125]

Restrictive practices and cognitive impairment

The use of physical restraints has been associated with delirium, and therefore, their use should be kept to a minimum. There have been positive outcomes for older people with the use of restraint-free environments in 'delirium rooms' in hospitals that provide 24-hour nursing care and emphasise non-pharmacological approaches. [126] See Chapter 8 for more information on delirium.

Appendices

Chapter 19. Hip Protectors

Early studies (up to 2001) suggested that hip protectors reduced the incidence of hip fractures in institutional settings, and thus, they were widely introduced into practice. However, design flaws in these studies limit the strength of their conclusions. [127] Nevertheless, there is some evidence that, when worn correctly, hip protectors may prevent hip fractures in older people in hospitals or residential aged care services without increasing the frequency of falls. [127,128] Hip protectors may slightly increase the small risk of pelvic fractures. [127] Hip protectors can, therefore, be used as part of a multifactorial falls and injury prevention intervention in hospitals, although they will not prevent falls or protect other parts of the body. Poor acceptance and adherence to the use of hip protectors among older people is a barrier to their effective use. [127]

Irrespective of their effectiveness, hip protectors must be worn correctly if they are to have any benefit. An Australian study looked at the feasibility of introducing hip protectors into the hospital ward environment. [129] Older people with the highest risk of falling were identified using a fall risk assessment tool and then encouraged to wear hip protectors for the remainder of their hospital stay (n=30). Of these 30 older persons, 29 wore the hip protectors for the remainder of their hospital stay, and 27 still wore them two weeks after discharge. A questionnaire revealed that nursing staff had a high acceptance of hip protectors, with only minor problems experienced regarding adherence and wearing them during the day. This study suggests that the use of hip protectors in the hospital setting may be beneficial; however, further larger studies are needed.

One trial of hip protectors noted adverse effects in 5% of older people. [130]

The 2014 Cochrane Collaboration Review [1] contains tables that summarise the randomised trials of hip protectors. See http://www.thecochranelibrary.org and search for 'hip protectors'.

Adherence to hip protectors

A disadvantage of hip protectors is a low level of adherence due to discomfort, impracticality, the extra effort needed to put them on, or urinary incontinence. [131-134] In some settings, the cost might also be a barrier to hip protector use. [135] Findings from one RCT offering hip protectors at no cost to community-living older people at high risk of hip fracture showed a modest increase in initial acceptance and adherence with hip protector use and that education may further increase hip protector use. [136] Providing hip protectors at no cost can increase initial acceptance and adherence to hip protector use in community-dwelling older people at high risk of hip fracture. [136] This can also be applied in the hospital context to increase adherence with the use of hip protectors.

Adherence to the use of hip protectors is crucial to their effectiveness. [137] In the first reported randomised trial of hip protectors, only 24% of a subgroup of participants were wearing hip protectors when they fell. [138] This trial was included in a 2014 Cochrane review of hip protectors, and the other trials included also reported low adherence rates, which may have influenced the outcome. [1]

In 2003, Queensland Health developed a set of best practice guidelines for residential aged care services, which included the following feedback from focus groups and health professionals on why protector pads were difficult to introduce as standard practice: [139]

- They caused skin rashes and increased perspiration.
- They were uncomfortable to sleep in and had the potential to cause pressure sores.
- They were difficult to wash, particularly for older people with incontinence.
- Replacing them was costly.
- There were infection-control issues.
- Some older people removed or refused to wear them.
- They were considered too big or bulky, particularly with incontinence pads, catheters and dressings.

- They move and can become uncomfortable.
- There was not enough information about how to fit them.
- Some staff did not always support older people to use them or were sceptical about their efficacy.
- There were problems with price, style and comfort for the wearer, including image perception.

Chapter 20. Vitamin D & Calcium

An Australian study found that 86% of women and 68% of men in residential aged care services (RACS) have vitamin D deficiency, and virtually all the remainder have a level in the lower half of the reference range. [140]

Vitamin D levels are measured by blood serum 25-hydroxyvitamin D (25(OH)D) levels. Previously recommended levels of 25(OH)D considered indicative of adequate vitamin D stores may be too low. [141]

Vitamin D supplementation (with or without calcium) in the community setting

Several systematic reviews have assessed vitamin D supplementation as an intervention to prevent falls in older community-dwelling people. These studies have reached different conclusions regarding the overall effectiveness of vitamin D supplementation on the incidence of falls. [142] However, subgroup analysis in some systematic reviews has reported a significant reduction in the incidence of falls in older people with vitamin D deficiency. [143, 144]

For example, a recent systematic review conducted a meta-analysis of 21 RCTs (51,984 participants) of vitamin D supplementation alone (daily or intermittent doses of 400-60,000 IU) and found no benefit with respect to reduced risk of falls (RR= 1.00, 95% C= 0.95 to 1.05) compared to placebo or no treatment. However, a sub-group analysis showed that vitamin D supplementation reduced falls by 23% (RR 0.77, 95% CI 0.61 to 0.98) in participants with serum 25(OH)D concentration levels less than 50 nmol/L. [143]

Importantly, two randomised controlled trials have reported that very high doses of vitamin D supplementation can increase the risk of falls. A double-blind, placebo-controlled trial of 2256 community-dwelling women aged 70 years or older found that a single high dose of 500,000 IU vitamin D administered orally for 3 to 5 years resulted in a 15% increase in falls and a 26% increase in fractures. [145] The second trial included 200 older community-dwelling people with a history of falls. It found that 66% of those randomised to a high monthly dose of vitamin D supplementation (60,000 IU per month) fell during the 12-month study period, which was significantly higher compared to the comparison lower dose (24,000 IU per month) group - 48% ($p < 0.05$). [146]

Healthy Bones Australia (formerly Osteoporosis Australia) recommends a daily intake (RDI) of 1300mg of calcium per day for men aged over 70 and women aged over 50. Below these ages, the recommendation is 1,000mg per day for both men and women. The best way to achieve recommended calcium intake is to eat a diet rich in calcium. Due to concerns about calcium supplementation increasing the risk of cardiovascular events, [147, 148] calcium supplementation should be restricted to a maximum dose of 500 – 600 mg elemental calcium per day if dietary calcium intake is insufficient.

Vitamin D supplementation (with or without calcium) in the residential aged care setting (RACS)

A 2018 high-quality systematic review examined interventions, including vitamin D supplementation, for preventing falls in hospital and RACS settings.[1] The review included eight studies (n = 9,278), four of which were similar enough for their data to be pooled. The pooled results showed that vitamin D with calcium is effective for preventing falls in older people living in RACS, and that the benefits of supplementation are more certain in older people who had low serum vitamin D. A systematic review based on Cochrane Collaboration methods undertaken for these guidelines did not identify any new eligible trials. Therefore, the conclusions reached in the 2018 review [1] remain unchanged.

Pooled data from three trials in the 2018 Cochrane review showed little effect of vitamin D supplementation on fall-related fractures.

A separate study of the alfacalcidol form of vitamin D supplementation in non-vitamin D-deficient older people in the community supports the hypothesis that treatment with vitamin D (or its analogues) requires a minimum daily calcium intake of more than 500 mg/day to produce clinically significant results. [149]

Calcium supplementation should be approached with caution in women older than 70 years of age. A large trial of calcium supplementation of 1000 mg/day found an excess of cardiovascular events in the intervention group. [147,148] The Nottingham Neck of Femur study (which was not included in the 2018 review discussed above [1]) concluded that vitamin D administered orally or injected increases bone mineral density and decreases falls, and that calcium co-supplementation may help.[150]

Toxicity

Toxicity to vitamin D cannot be caused by prolonged sun exposure; however, it can occur with supplementation with vitamin D. [151] Hypercalcemia may occur if vitamin D is given, particularly in the form of vitamin D analogues. A 2015 review found there is no increased risk of death from taking calcium and vitamin D; however, there is a small but significant increase in gastrointestinal symptoms and renal disease. [152] Toxicity with cholecalciferol (vitamin D3) up to 10,000 international units (IU) daily is rare. It occurs predominantly if dietary or oral calcium supplements are high or if granulomatous disorders are present.

There is also evidence in community settings that high doses of vitamin D supplementation may increase the risk of falls. A double-blind, placebo-controlled trial of 2256 community-dwelling women aged 70 years or older found that a single high dose of 500,000 IU vitamin D administered orally for 3-5 years resulted in a 15% increase in falls and a 26% increase in fractures. [145] The increased risk was pronounced during the 3-month post-dose period when serum 25-OHD levels would have been highest. Another trial also found that high monthly doses of vitamin D supplementation increased falls in 200 community-dwelling older people who had fallen in the last year. [146]

Effect on falls

The use of vitamin D for preventing falls has been studied in detail. Several meta-analyses with different inclusion criteria examining the effect of vitamin D on falls in older people have reported conflicting results. [142-144,153,154]

Chapter 22. Post-fall management

A meta-analysis of interventions aimed at improving the ability to rise from the floor revealed no improvement in time to rise from the floor; however, a subgroup analysis of resistance training interventions showed a trend toward significance. [155] The authors noted limitations due to small sample sizes and limiting populations to healthy community-dwelling older people, where those at most risk of being unable to rise from the floor are frail, have increased fall risk and multiple comorbidities.

Appendices

Supplement 3A:
RCTs of fall prevention in hospitals included 2017–2021, meeting inclusion criteria of Cameron et al. 2018, reporting data suitable for meta-analysis of the rate of falls or risk of falling

Reference	Country	Intervention (ProFANE)
Daley 2021 [112]	USA	Social environment: organisational service model change (staff rounding)
Gazineo 2021 [156]	Italy	Exercise – general physical activity
Hempenius 2012 [157]	The Netherlands	Social environment: organisational service model change (Pre-operative geriatric consultation, daily visits by geriatric nurse)
Jellett 2020[#] [7]	Australia	Social environment: Fall risk assessment scoring
Liang 2020 [158]	China	Exercise – comparison of alternate exercise programs: balance & resistance vs resistance
Martinez 2012 [159]	Chile	Multiple component: education, environmental modification
Martinez-Velilla 2019, 2021[3] [160, 161]	Spain	Exercise: multiple component (Vivfrail)
Morris 2020, 2021 [162, 8]	Australia	Social environment: Fall risk assessment scoring
Partridge 2017 [163]	UK (England)	Social environment: organisational service model change (Pre-operative comprehensive geriatric assessment)
Pfeiffer 2020 [18]	Germany	Multicomponent (multiple interventions): cognitive behavioural modification, communication, exercise, education
Peyrusque 2021[3] [164]	Canada	Exercise: exercise & decision tree tool (MATCH: Maintenance of Autonomy Through exerCise in Hospital setting)
Scheffers-Barnhoorn 2017, 2019, 2021 [165-167]	The Netherlands	Multiple component: cognitive behavioural, exercise, education
Young 2020 [17]	UK (England & Wales)	Multifactorial

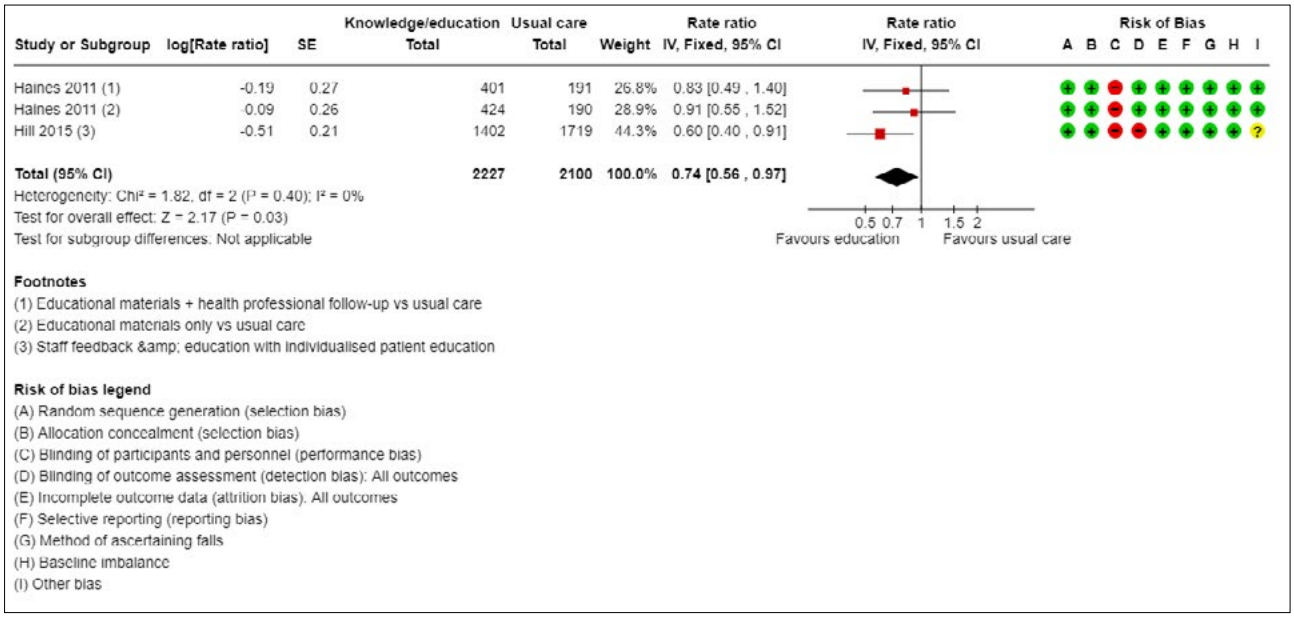
3 Zero falls in one study arm, so study does not appear in meta-analysis Forest plot.

Appendices

Supplement 3B:
Updated meta-analyses, searches to December 2021

Education

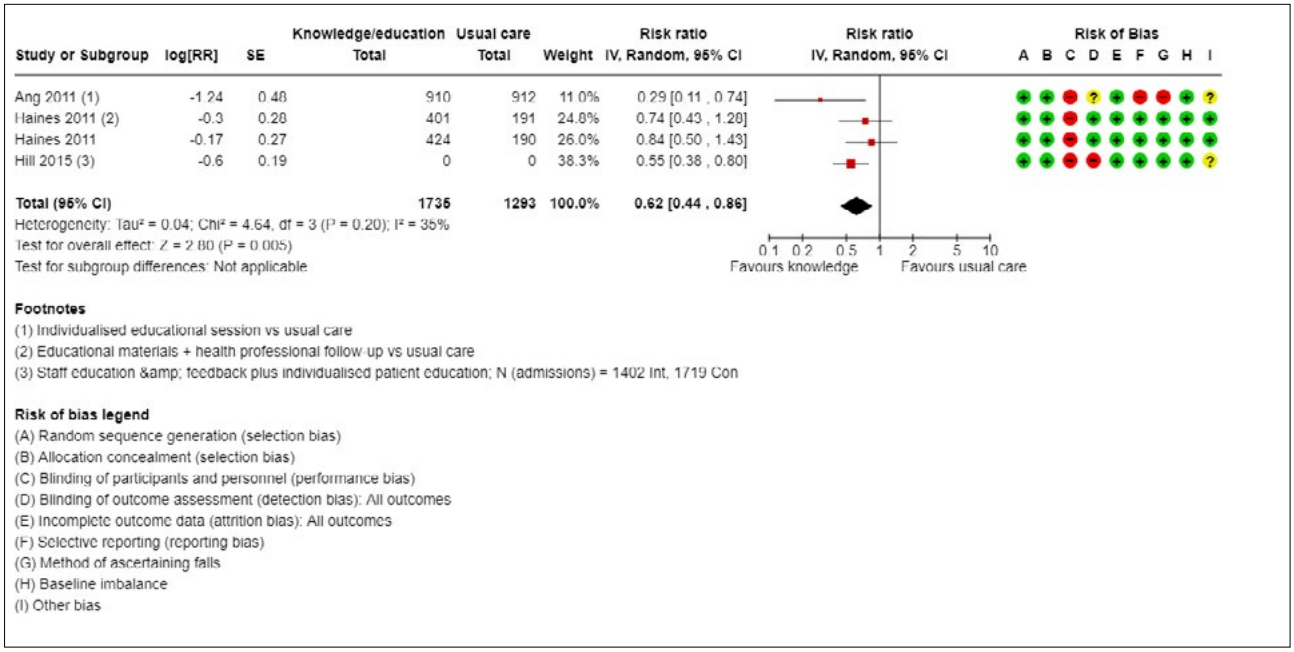
Rate of falls:



Footnotes
(1) Educational materials + health professional follow-up vs usual care
(2) Educational materials only vs usual care
(3) Staff feedback & education with individualised patient education

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

Risk of falling:



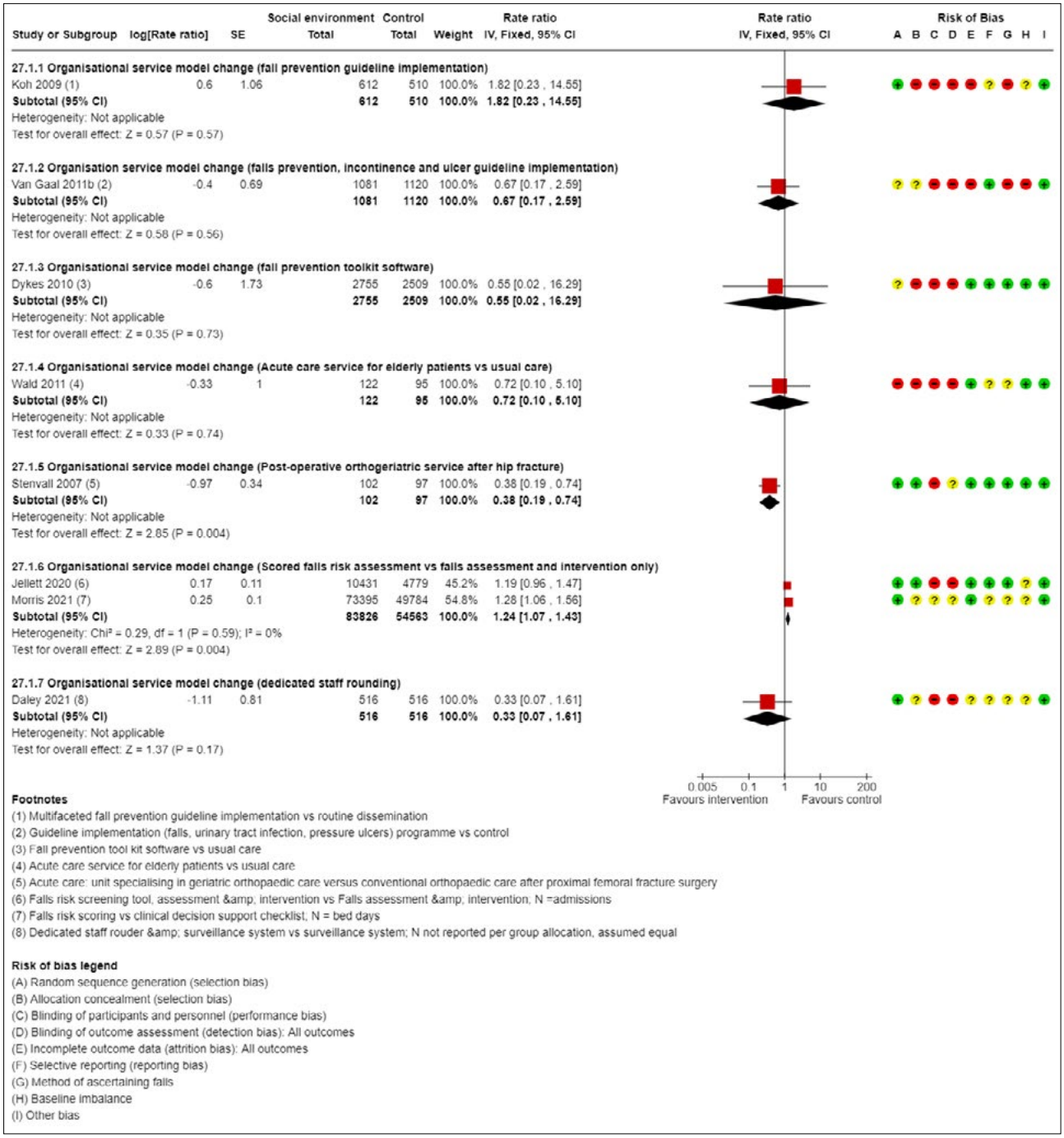
Footnotes
(1) Individualised educational session vs usual care
(2) Educational materials + health professional follow up vs usual care
(3) Staff education & feedback plus individualised patient education; N (admissions) = 1402 Int, 1719 Con

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

Appendices

Social Environment Change (Organisational service model change)

Rate of falls:



Footnotes

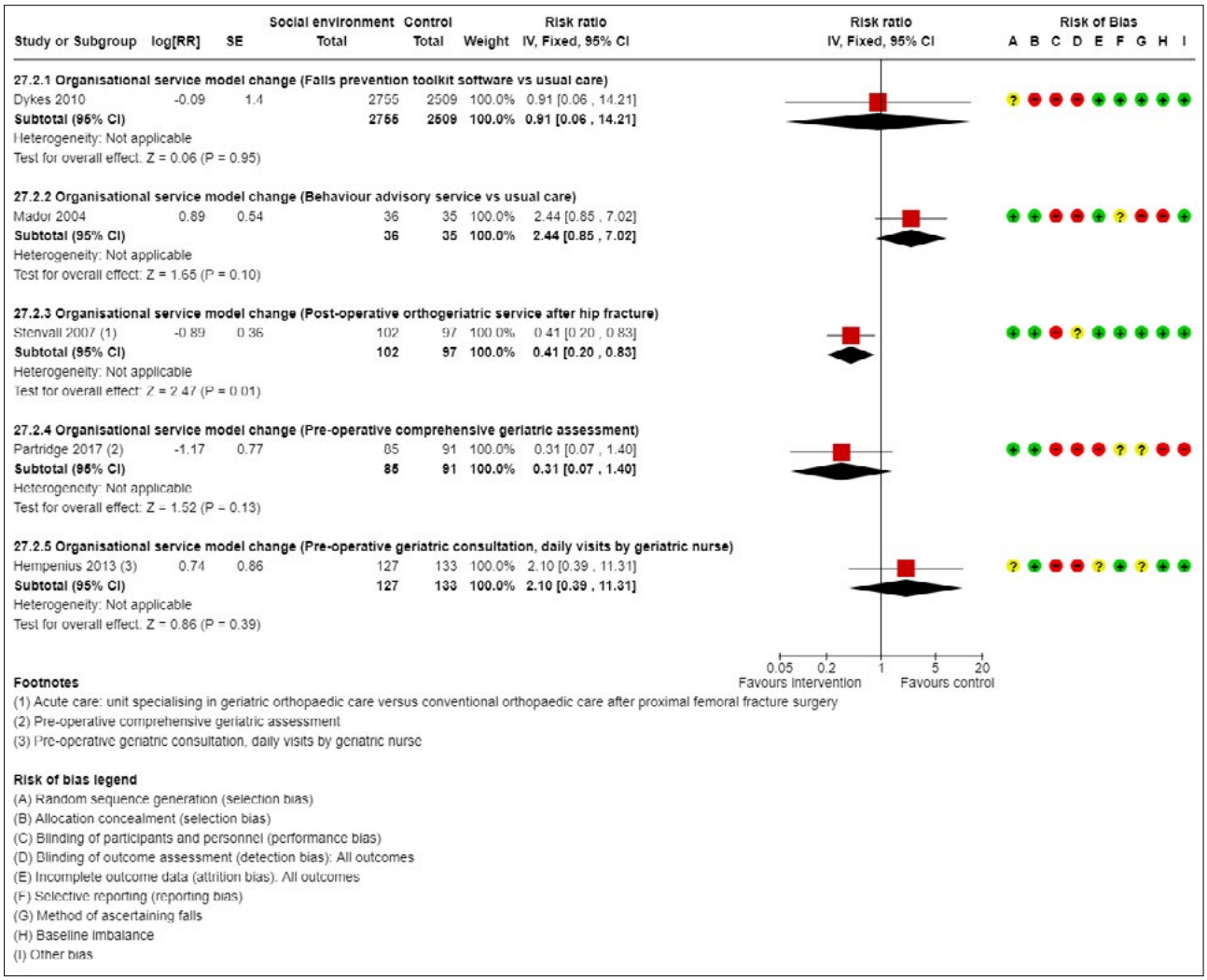
(1) Multifaceted fall prevention guideline implementation vs routine dissemination
(2) Guideline implementation (falls, urinary tract infection, pressure ulcers) programme vs control
(3) Fall prevention tool kit software vs usual care
(4) Acute care service for elderly patients vs usual care
(5) Acute care: unit specialising in geriatric orthopaedic care versus conventional orthopaedic care after proximal femoral fracture surgery
(6) Falls risk screening tool, assessment & intervention vs Falls assessment & intervention; N =admissions
(7) Falls risk scoring vs clinical decision support checklist; N = bed days
(8) Dedicated staff rouder & surveillance system vs surveillance system; N not reported per group allocation, assumed equal

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

Appendices

Risk of falling:



Footnotes

(1) Acute care: unit specialising in geriatric orthopaedic care versus conventional orthopaedic care after proximal femoral fracture surgery
(2) Pre-operative comprehensive geriatric assessment
(3) Pre-operative geriatric consultation, daily visits by geriatric nurse

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

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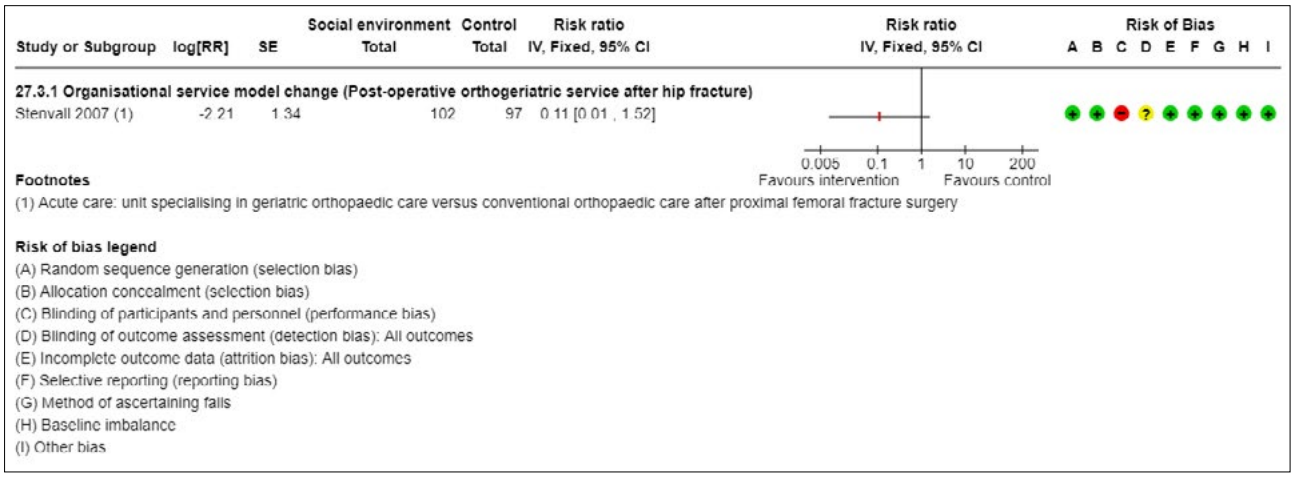
Risk of fracture:



Study or Subgroup	log[RR]	SE	Social environment Total	Control Total	Risk ratio IV, Fixed, 95% CI
27.3.1 Organisational service model change (Post-operative orthogeriatric service after hip fracture)					
Stenvall 2007 (1)	-2.21	1.34	102	97	0.11 [0.01 , 1.52]

Risk ratio IV, Fixed, 95% CI: 0.005 0.1 1 10 200 — Favours intervention / Favours control

Risk of Bias: A B C D E F G H I

Footnotes

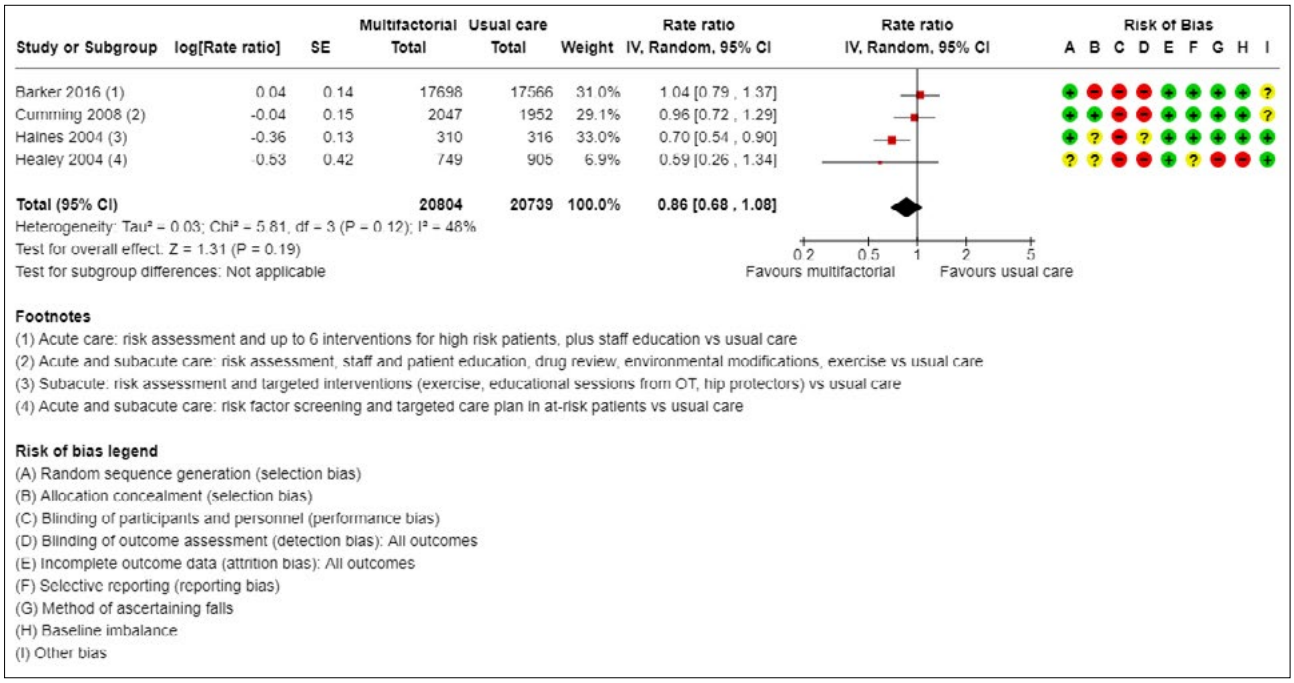
(1) Acute care: unit specialising in geriatric orthopaedic care versus conventional orthopaedic care after proximal femoral fracture surgery

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

Multifactorial interventions

Rate of falls:



Study or Subgroup	log[Rate ratio]	SE	Multifactorial Total	Usual care Total	Weight	Rate ratio IV, Random, 95% CI
Barker 2016 (1)	0.04	0.14	17698	17566	31.0%	1.04 [0.79 , 1.37]
Cumming 2008 (2)	-0.04	0.15	2047	1952	29.1%	0.96 [0.72 , 1.29]
Haines 2004 (3)	-0.36	0.13	310	316	33.0%	0.70 [0.54 , 0.90]
Healey 2004 (4)	-0.53	0.42	749	905	6.9%	0.59 [0.26 , 1.34]
Total (95% CI)			**20804**	**20739**	**100.0%**	**0.86 [0.68 , 1.08]**

Heterogeneity: Tau² = 0.03; Chi² = 5.81, df = 3 (P = 0.12); I² = 48%
Test for overall effect: Z = 1.31 (P = 0.19)
Test for subgroup differences: Not applicable

Rate ratio IV, Random, 95% CI: 0.2 0.5 1 2 5 — Favours multifactorial / Favours usual care

Risk of Bias: A B C D E F G H I

Footnotes

(1) Acute care: risk assessment and up to 6 interventions for high risk patients, plus staff education vs usual care
(2) Acute and subacute care: risk assessment, staff and patient education, drug review, environmental modifications, exercise vs usual care
(3) Subacute: risk assessment and targeted interventions (exercise, educational sessions from OT, hip protectors) vs usual care
(4) Acute and subacute care: risk factor screening and targeted care plan in at-risk patients vs usual care

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

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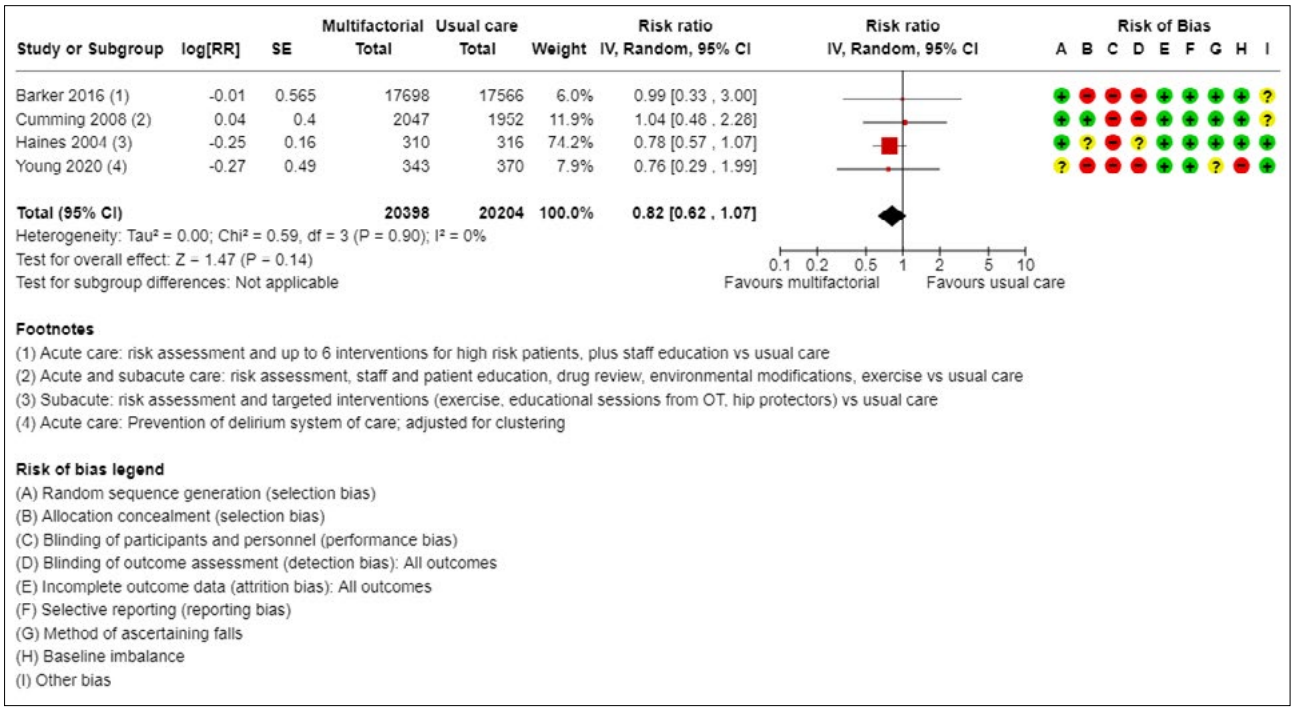
Risk of falling:



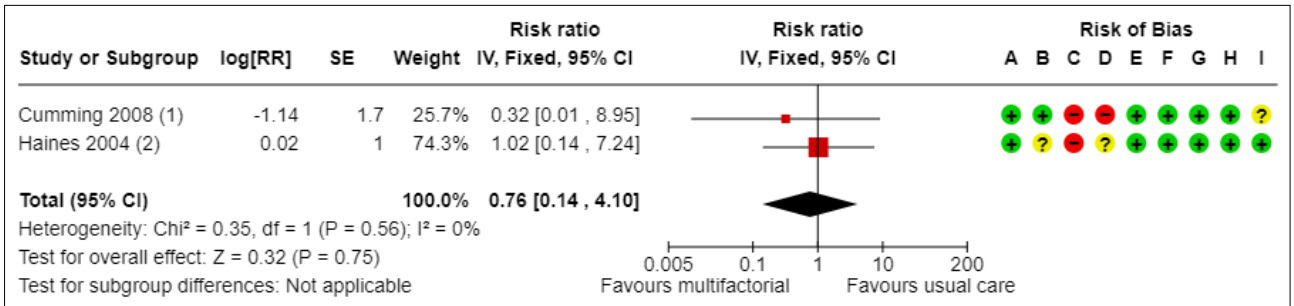
Footnotes

(1) Acute care: risk assessment and up to 6 interventions for high risk patients, plus staff education vs usual care
(2) Acute and subacute care: risk assessment, staff and patient education, drug review, environmental modifications, exercise vs usual care
(3) Subacute: risk assessment and targeted interventions (exercise, educational sessions from OT, hip protectors) vs usual care
(4) Acute care: Prevention of delirium system of care; adjusted for clustering

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

Risk of fracture:



Footnotes

(1) Acute and subacute care: risk assessment, staff and patient education, drug review, environmental modifications, exercise vs usual care
(2) Subacute: risk assessment and targeted interventions (exercise, educational sessions from OT, hip protectors) vs usual care

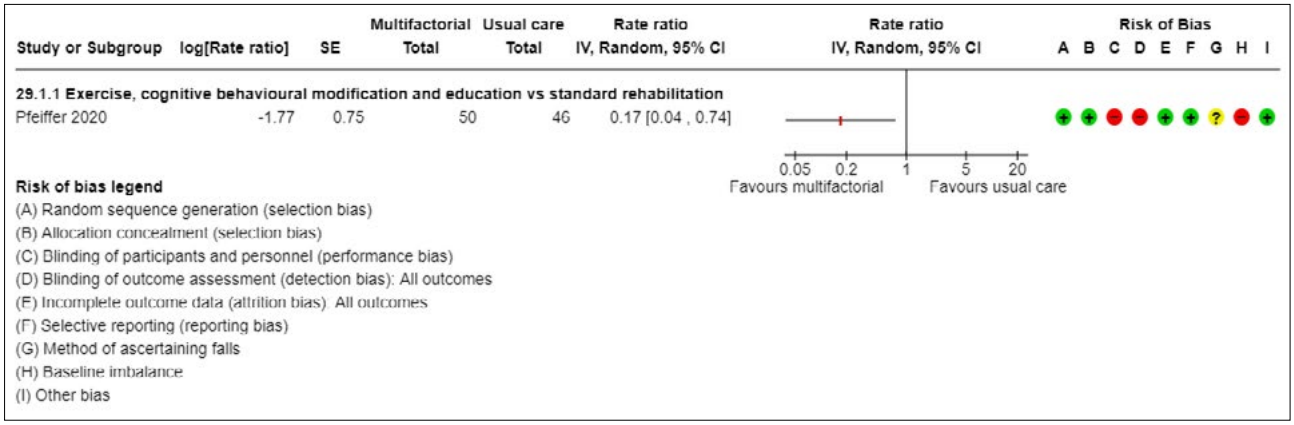
Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias): All outcomes
(E) Incomplete outcome data (attrition bias): All outcomes
(F) Selective reporting (reporting bias)
(G) Method of ascertaining falls
(H) Baseline imbalance
(I) Other bias

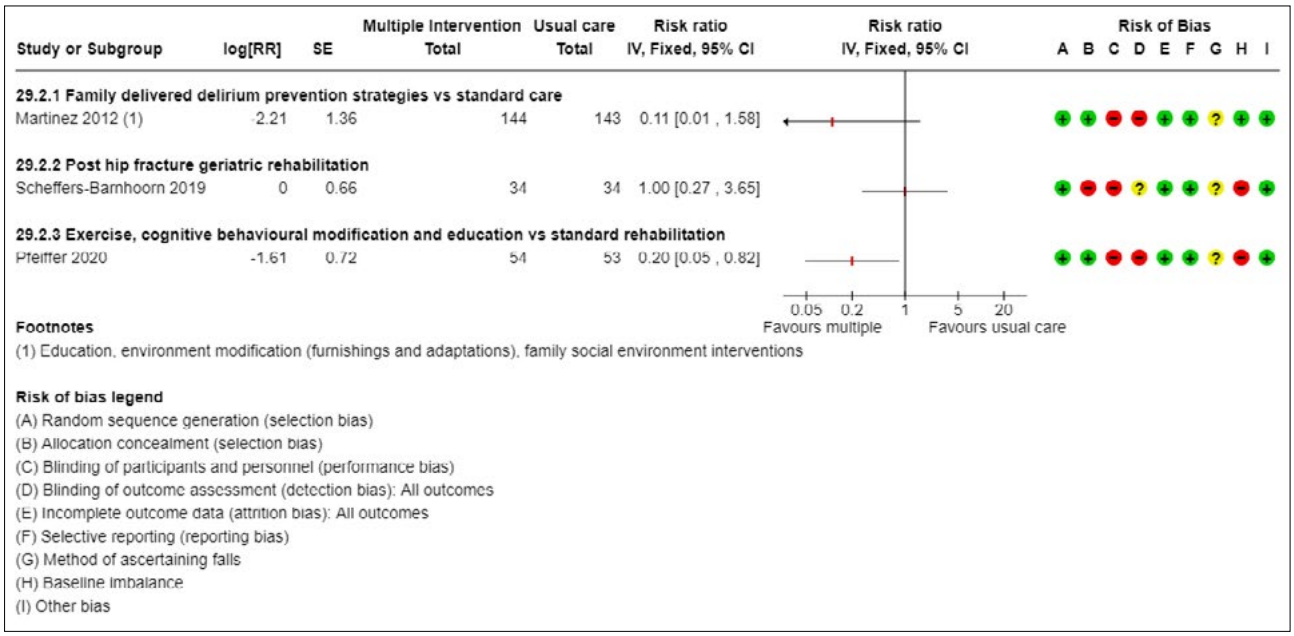
Appendices

Multiple Interventions (multicomponent)

Rate of falls:



Risk of falling:



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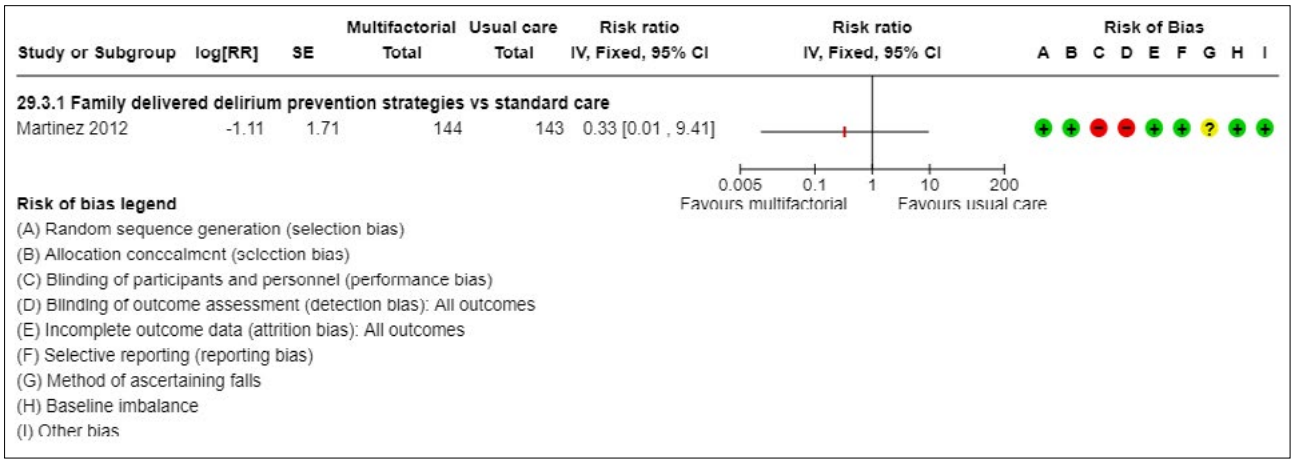
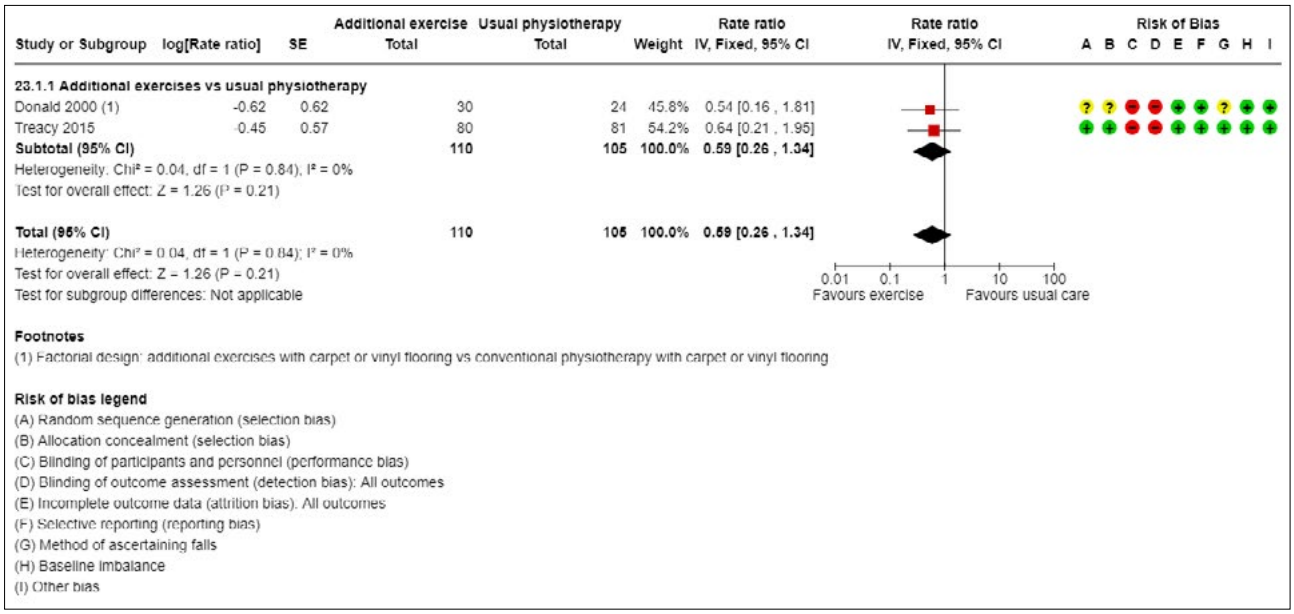
Risk of fracture:



Exercise

Rate of falls:



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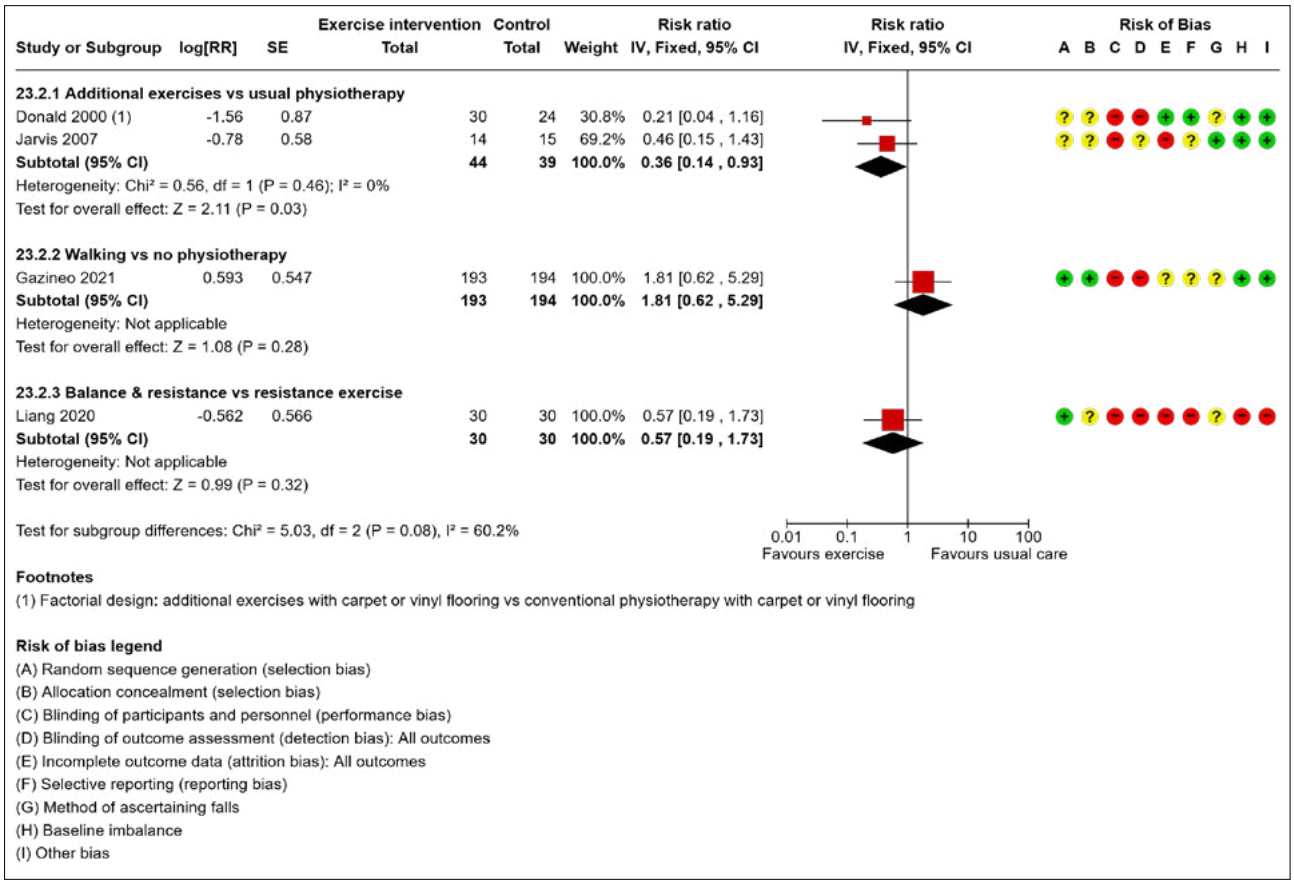
Risk of falling:



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Glossary

Cognitive impairment: Impairment in one or more domains of normal brain function (e.g. memory, perception, calculation).

Cognitively intact: Suffering no form of cognitive impairment.

Comorbidity: Two or more health conditions or disorders occurring at the same time.

Delirium: An acute change in cognitive function characterised by fluctuating confusion, impaired concentration and attention.

Dementia: Impairment in more than one cognitive domain that impacts on a person's ability to function, and that progresses over time.

Extrinsic factors: Factors that relate to a person's environment or their interaction with the environment.

Fall: A standard definition of a fall should be used in Australian facilities, so that a nationally consistent approach to fall prevention can be applied. For these guidelines, the expert panel and taskforce agreed on the following definition: 'A fall is an event which results in a person coming to rest inadvertently on the ground or floor or other lower level'. World Health Organization.

Falls Guidelines: Used in place of the full title of these guidelines, Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines for Australian Hospitals 2009.

Fall risk assessment: A more detailed and systematic process than a fall risk screen and is used to identify a person's risk factors for falling.

Fall risk screen: The minimum process for identifying older people at greatest risk of falling. It is also an efficient process, because fewer than five risk factors are usually required to identify who should be assessed more comprehensively for fall risk.

Hip protector: A device worn over the greater trochanter of the femur, designed to absorb and deflect the energy created by a fall away from the hip joint. The soft tissues of the surrounding thigh absorb the energy instead.

Hospital: Refers to both acute and subacute settings.

Hypotension, orthostatic: A drop in blood pressure resulting from a change in position from lying to standing.

Hypotension, postprandial: A drop in blood pressure experienced after eating.

Incremental cost effectiveness ratio (ICER): A measure of the cost effectiveness of an intervention, which is calculated by comparing the costs and health outcomes of the new program with the costs and health outcomes of an alternative health care program. Interventions with lower ICERs are better value for money.

Injurious fall: These guidelines use the Prevention of Falls Network Europe (ProFaNE) panel definition of an injurious fall. They consider that the only injuries that could be confirmed accurately using current data sources were peripheral fractures (defined as any fracture of the limb girdles and of the limbs). Head injuries, maxillo- facial injuries, abdominal, soft tissue and other injuries are not included in the recommendation for a core dataset.

However, other definitions of an injurious fall include traumatic brain injuries (TBIs) as a falls-related injury, particularly as falls are the leading cause of TBIs in Australia.

Intervention: A therapeutic procedure or treatment strategy designed to cure, alleviate or improve a certain condition.

Intrinsic factors: Factors that relate to a person's behaviour or condition.

Life-years saved or life-years generated (LYS): A measure of the gain in health outcomes from an intervention.

Glossary

Multifactorial interventions: Where people receive multiple interventions, but the combination of these interventions is tailored to the individual, based on an individual assessment.

Multiple interventions: Where everyone receives the same, fixed combination of interventions.

Older person or older people: These guidelines define older people as 65 years of age and over. When considering Aboriginal and Torres Strait Islander peoples, the term 'older people' refers to people 50 years of age and over.

Pharmacodynamics: The study of the biochemical and physiological effects that medications have on the body.

Pharmacokinetics: The study of the way in which the body handles medications, including the processes of absorption, distribution, excretion and localisation in tissues and chemical breakdown.

Psychoactive medicine: A medicines that affects the mental state. Psychoactive medicines include antidepressants, anticonvulsants, antipsychotics, mood stabilisers, anxiolytics, hypnotics, antiparkinsonian medicines, psychostimulants and dementia medicines.

Quality-adjusted life year (QALY): A summary measure used in assessing the value for money of an intervention. It is based on the number of years of life that would be added by an intervention, and combines survival and quality of life in a single composite measure.

Residential aged care services (RACS): Refers to both high-care and low-care settings.

Restraint: A form of restrictive practice.

Restrictive practice: Any practice or intervention that has the effect of restricting the rights or freedom of movement of individuals.

Root-cause analysis (RCA): An in-depth analysis of an event, including individual and broader system issues, to provide greater understanding of causes and future prevention.

Single interventions: Interventions targeted at single risk factors.

Syncope: A temporary loss of consciousness with spontaneous recovery, which occurs when there is a transient decrease in cerebral blood flow.

Vision: The ability of the unaided eye to see fine detail.

Visual acuity: A measure of the ability of the eye to see fine detail when the best glasses or contact lens prescription is worn. Visual acuity (VA) = d/D (written as a fraction) where: d = the viewing distance (usually 6 metres), and D = the number under or beside the smallest line of letters that the person is able to see. Normal visual acuity is 6/6 or better. If someone can only see the '60' line at the top of the chart, the acuity is recorded as being 6/60. Some people can see better than 6/6 (e.g. 6/5, 6/3); however, 6/6 has been established as the standard for good vision.

Z-drugs: A class of non-benzodiazepine hypntics used for insomnia; for example, zolpidem and zopiclone.

Acronyms and abbreviations

Acronym	Meaning
25(O)HD	25-hydroxyvitamin D
BMD	Bone mineral density
BPPV	Benign paroxysmal positional vertigo
DEMMI	De Morton Mobility Index
DXA	Fracture Risk Assessment Tool
FESI	Falls Efficacy Scale International
FRAT	Peninsula Health Falls Risk Assessment Tool
FRAX	Fracture Risk Assessment Tool
FRHOP	Falls Risk for Hospitalised Older People
FROP-Com	Falls risk for older people in the community
IRR	Incidence Rate Ratio
IU	International units
JBI-PACES	Joanna Briggs Institute Practical Application of Clinical Evidence System
MMSE	Mini Mental State Examination
NARI	National Ageing Research Institute
(OH)D	Hydroxyvitamin D
PAS	Psychogeriatric Assessment Scales
PBS	Pharmaceutical Benefits Scheme
PHFST	Peninsula Health Falls Screening Tool
PJC-FRAT	Peter James Centre Fall Risk Assessment Tool
POMA	Tinetti Performance-Oriented Mobility Assessment Tool
ProFaNE	Prevention of Falls Network Europe
PROFET	Prevention of Falls in the Elderly Trial
RACS	Residential aged care service
RCT	Randomised controlled trial
RDI	Recommended dietary intake
RUDAS	Rowland Universal Dementia Scale
SAC	Severity Assessment Code
SARRAH	Services for Australian Rural and Remote Allied Health
SERM	Selective oestrogen receptor modulators
STRATIFY	St Thomas Risk Assessment Tool in Falling Elderly
TUG	Timed Up and Go Test
VR	Vestibular rehabilitation

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