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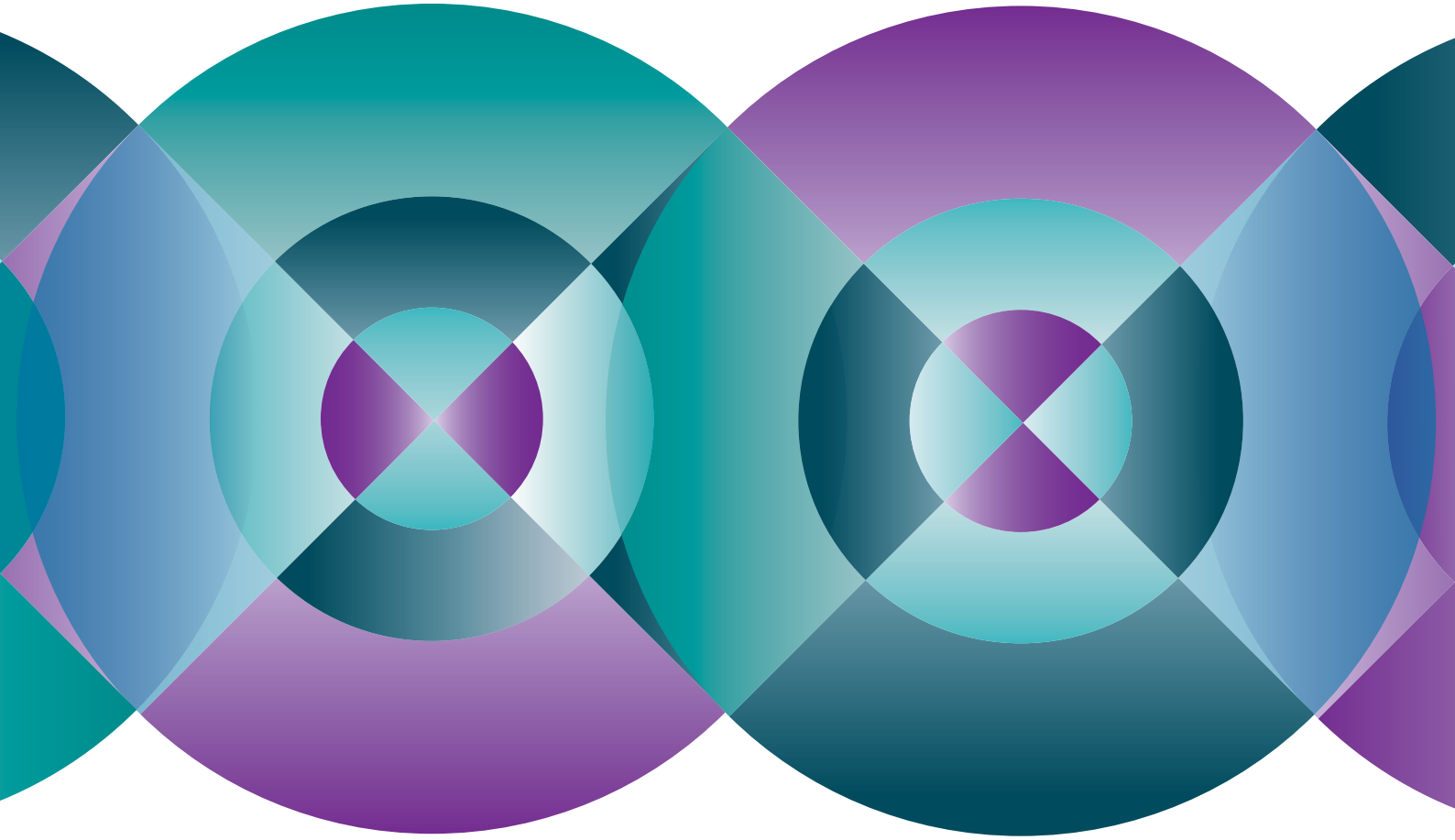

Preventing falls and harm from falls in Older People

Best Practice Guidelines for Australian Residential Aged Care Services

Reference Document

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Executive summary

Minimising falls and their harm and maximising mobility to prevent functional decline remain a key challenge for the provision of high-quality care of older people who live in residential aged care services (RACS). 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 Residential Aged Care Services* (the Falls Guidelines) provides best practice advice and supporting resources on preventing falls and harm from falls in older people for health professionals and the aged care workforce (relative to their scope of practice or role) providing care in RACS in Australia.

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

- *Reference Document* (this document): presents the international evidence on best practice, which 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 RACS.
- *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. These offer 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 living in RACS does not exist, equivalent evidence for older people living in the community has been used.

The guidelines seek to guide all aspects of care to older people in RACS 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 hospital and community care settings.

Recommendations and Good Practice Points

The recommendations and good practice points listed in Chapter 2 are designed to guide RACS and their workforce in providing the best possible care to older people living in RACS and preventing falls and their associated harm.

- **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 used in the 2022 World Falls Guidelines for Prevention and Management of Falls in Older Adults is provided with each recommendation.
- **Good practice points** guide all aspects of care of older people in RACS 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 the RACS workforce, the multidisciplinary team and the older person and their carers and family (to the extent that 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.**[1]

Many falls can be prevented, and health professionals and the aged care workforce have a key role in preventing falls in RACS. Fall and injury prevention need to be addressed and embedded across every aspect of care in RACS. Fall prevention should be a core element of an older person's plan of care in a RACS.

All people in RACS are at risk of falling

The risk of falls, frequency of falls and the severity of fall-related injury increases with age. Falls are a common reason for older people presenting to the emergency department and commencing care in a RACS.

Every person living in RACS should be considered at high risk of falling and be individually assessed for which fall prevention interventions are necessary.

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 person to address complex needs and optimise their quality of life. Changes to a person's fall risk should be communicated to the person, their carers and family and the multidisciplinary team.

Fall prevention interventions should be monitored and reviewed regularly for their safety and effectiveness.

1 World Health Organization. Step Safely: Strategies for Preventing and Managing Falls across the Life-Course. Geneva: World Health Organization, 2021.

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 RACS 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.

1 Purpose and use of the guidelines

Falls are a significant cause of harm to older people, particularly for those living in residential aged care or requiring aged care services at home. Many falls can be prevented. Fall and injury prevention is everyone's responsibility.

The Royal Commission into Aged Care Quality and Safety identified fall prevention and maintenance of mobility for older people receiving aged care services as significant priorities as part of a range of recommended reforms to Australia's aged care system.[1]

The *Aged Care Quality Standards* were strengthened in response to the Royal Commission's recommendations and include falls as a key clinical safety topic. All Australian Government-funded aged care providers must meet the requirements detailed in the Aged Care Quality Standards. Residential aged care services (RACS) are expected to implement systems and processes that minimise falls and harm from falls and support older people to maximise their mobility to prevent functional decline in line with the Aged Care Quality Standards.

1.1 About the guidelines

The *Preventing Falls and Harm from Falls in Older People: Best Practice Guidelines for Australian Residential Aged Care Services* aims to improve the safety and quality of care for older people and offers a nationally consistent approach to preventing falls and harm from falls in residential aged care settings.

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

- *Reference Document* (this document): presents the international evidence on best practice, which 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 RACS.
- *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 on the previous guidelines published in 2005 and 2009 and reviewed international best practice, policies and procedures.[2, 3]

Separate Falls Guidelines have been developed for hospital and community 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.[4]

The Falls Guidelines focus on older people who are aged 65 and over. A broader age group is used for older Aboriginal and Torres Strait Islander people aged 50 years and over.[5]

People outside these age groups who are at risk of falling and 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.

While the guidelines refer to older people, the discussion and interventions apply to all those people who are receiving care in residential aged care settings in Australia.

1.2.2 Specific to Australian residential aged care services

The Falls Guidelines have been developed for health professionals and the aged care workforce (relative to their scope of practice or role) providing care in Australian RACS. This includes support services as well as clinical, management and corporate staff.

RACS providers can use many aspects of these guidelines to inform fall prevention among older people receiving aged care services in RACS.

The Falls Guidelines recommend that RACS consider all older people at risk of falling and individually assess each older person to determine which fall prevention interventions are necessary.

The guidelines are not specifically directed at retirement villages, although much of the content is also applicable to this setting.

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 continue to 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.

The Falls Guidelines recognise the important role that an older person's carers, family and substitute decision makers can play in fall prevention. The extent of the involvement of these other people in the care of the older person must be in line with the wishes of the older person.

1.3 Terminology

1.3.1 Suitably qualified health professional

The Falls Guidelines are designed to guide health professionals and the aged care workforce (relative to their scope of practice or role) in providing care in RACS in Australia. To accommodate the diversity of health professionals involved in the aged care workforce, 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.'[6]

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.[7]

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 by their ability to perform certain tasks and activities of daily living (ADL). This includes dressing, feeding, grooming and mobilising.

Fall risk assessment is a detailed and systematic process used to identify an older person's risk factors for falling. 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 RACS.

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 be in 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.[8]

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 RACS and decreasing the number of people who fall in RACS.

1.4 Development of the guidelines

Experts from the Australian and New Zealand Falls Prevention Society oversaw the development of the Falls 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 services[9]
- reference to the 2022 World Falls Guidelines for Prevention and Management of Falls in Older Adults[10]
- 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 [9] and additional research is in Appendix 3.

1 Purpose and use of the guidelines

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.[10]

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 Purpose and use of the guidelines

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 RACS in Australia.

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

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 the aged care workforce (relative to their scope of practice or role) should consider the advantages and risks of using injury prevention strategies to minimise falls and related injuries and support older people to exercise 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.

1 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 Residential Aged Care Services*.

Recommendations

1. **Multifactorial interventions:** Provide multifactorial fall prevention interventions as part of routine care for all older people. This should include:
   - ☐ Regularly assessing both individual and RACS level fall risk factors, including assessment for environmental interventions and medication review
   - ☐ Developing a tailored fall prevention plan based on the findings of the older person's fall risk assessment
   - ☐ Providing education and engaging the workforce about preventing falls and harm from falls in older people. (Level 1A).
2. **Tailored exercise:** Provide tailored supervised exercise to all older people who choose to participate. Ensure health professionals (e.g. physiotherapists or exercise physiologists) or appropriately trained instructors design and deliver the exercise programs. (Level 1B)
3. **Continued exercise:** Provide continued exercise for fall prevention as the effect of structured exercise programs diminishes over time once the program has ended. (Level 1A)
4. **Hip protectors:** Consider the use of hip protectors for older people to reduce the risk of fall-related hip fractures. (Level 2A)
5. **Dairy food provision:** Ensure menus have at least 3.5 servings of dairy foods (milk, yoghurt, cheese) daily to meet the protein and calcium requirements of older people. Engage dietitians to assist with menu design that reflects dietary requirements and older people's needs and preferences. (Level 1B)
6. **Vitamin D and supplements:** Administer recommended doses of daily or weekly vitamin D supplements to all older people unless contraindicated. (Level 1A) Avoid monthly or once yearly mega doses of vitamin D as they can increase the risk of falls. (Level 1A)
7. **Osteoporosis medicines:** Administer prescribed osteoporosis medicine for older people with diagnosed osteoporosis or a history of minimal trauma fractures, unless contraindicated. (Level 1A)

Fall Risk Assessment for Tailoring Interventions

Recommendations

Multifactorial interventions: Provide multifactorial fall prevention interventions as part of routine care for all older people. This should include:

- regularly assessing both individual and RACS level fall risk factors, including assessment for environmental interventions and medication review
- developing a tailored fall prevention plan based on the findings of the older person's fall risk assessment
- providing education and engaging the workforce about preventing falls and harm from falls in older people. (Level 1A)

Good practice points

- Consider all older people in RACS to be at high risk of falls. Implement fall prevention interventions informed by comprehensive multifactorial fall risk assessments and the goals of care for the older person to minimise risk. Ensure delirium prevention, assessment and management are part of falls prevention.
- Consider all people with mobility or cognitive disabilities to be at high risk of falls, regardless of age.
- Ensure all health professionals and workers involved in the care of older people receive ongoing education about fall risk and fall prevention.
- Facilitate the involvement of the older person's general practitioner and nurse practitioner to coordinate care planning to maintain the older person's function and mobility, support reablement and ensure multidisciplinary care. Promote regular and effective communication with health professionals and workers about the older person's fall prevention plan of care, including with the older person's carers and family.
- Support the use of virtual care (e.g. telehealth) to facilitate fall prevention assessment and interventions for older people when appropriate and available.
- Support behavioural strategies and sleep hygiene to help regulate the older person's sleep-wakefulness cycles and improve their sleep quality. Minimise disturbing noise and disruptive care practices to optimise sleep duration and sleep quality for older people.
- Ensure older 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. Facilitate access to a dietitian when required.
- Provide meal assistance to older people who request or require help with eating and drinking to support nutritional intake and hydration.
- Partner with older people to reduce the risks of alcohol-related harm. See the Australian guidelines to reduce health risks from drinking alcohol.
- Engage with the older person following a fall to help identify and manage an increased fear of falling or loss of confidence with mobility to reduce the risk of further falls.

Balance and Mobility

Recommendations

Tailored exercise: Provide tailored supervised exercise to all older people who choose to participate. Ensure health professionals (e.g. physiotherapists or exercise physiologists) or appropriately trained instructors design and deliver the exercise programs. (Level 1B)

Continued exercise: Provide continued exercise for fall prevention, as the effect of structured exercise programs diminishes over time after the program has ended. (Level 1A)

Good practice points

- Assess the older person's balance, mobility and strength using validated tools to:
  - ☐ quantify the extent of their balance, mobility and muscle strength
  - ☐ guide the prescription of exercise, mobility aids and equipment
  - ☐ measure improvements in their balance, mobility and strength.
- Provide the level of hands-on assistance required to meet the older person's mobility needs.
- Support older people to exercise choice and dignity of risk to achieve their goals and maintain their independence and quality of life.
- Facilitate older peoples' participation in effective and continued exercise programs that:
  - ☐ are tailored to their abilities and preferences
  - ☐ include balance and strength exercises
  - ☐ are of moderate intensity
  - ☐ are sufficiently resourced, safe and engaging
  - ☐ are feasible to implement and accessible to all older people
  - ☐ include safe mobility and assessment of the need for mobility aids
  - ☐ balance the risks and benefits of restricting an older person's activity with maintaining their mobility to minimise the older person's functional decline and support safe mobilisation.

Cognitive Impairment

Good practice points

- Assess the older person's cognition at the commencement of care. Reassess their cognition regularly and when there is a change in their condition, including after a fall.
- Use a validated tool to assess older people for delirium, particularly when there is an acute change in cognitive function. Start treatment based on the cause when it can be identified. Consider sepsis as a cause for delirium. See the Sepsis Clinical Care Standard.
- Where delirium has been identified, ensure that the multicomponent interventions recommended for preventing and managing delirium are in place for the older person, including involving the older person's substitute decision-maker, carers or family and modifying the older person's environment. Use the Australian Clinical Practice Guidelines for the Management of Delirium in Older People
- Assess older 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 older people with cognitive impairment and substitute decision-makers in supported decision-making about the choice of fall prevention interventions and how to use them. Carers and family know the older person and may suggest ways to support them.
- Implement models of care that enable adequate supervision, equipment and support for the older person and respond to fluctuations in the older person's mobility, cognitive state and the impact of changed behaviours on others.
- For people with cognitive impairment, use reasonable adjustments to implement the *Fall Guidelines for RACS.* Reasonable adjustments should include (but are not limited to):
  - ☐ employing dementia-enabling techniques to create a physical environment that facilitates people living with dementia to feel supported and engaged
  - ☐ using tailored communication approaches to encourage the older person's participation in decision-making and care planning
  - ☐ involving the older person's carers and family in the assessment and design of fall prevention interventions.

Medicine and medicines review

Good practice points

- Facilitate access to a medical practitioner, nurse practitioner and pharmacist or a credentialled pharmacist to take a best possible medication history and review of all the older person's medicines:
  - ☐ at least yearly
  - ☐ after a fall
  - ☐ after initiating a new medicine
  - ☐ after a change in the older person's health status
  - ☐ after a dose or regimen change of a medicine
  - ☐ after admission to hospital or a rehabilitation service.
- Facilitate access to regular medication reviews, with a particular focus on medicines that impact cognition, falls and osteoporosis. Consider options to deprescribe and, if feasible, adjust, taper or cease medicines that increase fall risk (sometimes referred to as fall-risk-increasing drugs).
- Support health professionals to provide and discuss medicines-related information with the person and their carer and/or family when treatment options are being considered (including the review of and/or deprescribing medicines) and when treatment decisions have been made.
- Assess an older person's fall history and fall risk before using medicines that may increase fall risk.
- Facilitate access to a medical or nurse practitioner for prescribing medicines. Ensure medicines are commenced with an age-appropriate dose and doses are adjusted slowly based on regular monitoring for efficacy and the emergence of any adverse effects.
- Advise older people taking medicines about ways to reduce their risk of falling. This includes discussing the risks when the older person commences a new medicine or when the dose of an existing medicine is increased. Encourage the older person to report symptoms such as dizziness and use strategies to minimise fall risk, such as getting up slowly from a chair or bed.
- Implement non-medicine strategies for behaviour support planning, promoting sleep, addressing anxiety, depression and pain when indicated. Psychotropic medicines should only be considered when changed behaviours are causing significant distress or risk of harm to the person or others. If prescribed, document the purpose of the medicines medicine and the plan for review. See Psychotropic Medicines in Cognitive Disability or Impairment Clinical Care Standard.
- Communicate any recent or proposed changes to an older 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.
- Develop a tailored toileting plan with the older person that addresses what assistance they may require for toileting to minimise their risk of falling. This may include providing regular proactive toileting assistance, using continence aids or facilitating supervision in bathrooms.
- Proactively manage the older person's toileting, including nocturia (urge to urinate at night), urgency and frequency as part of a multifactorial approach to care.
- Manage symptomatic bacteriuria and reduce inappropriate use of screening and treatment with antimicrobials. Use the Therapeutic Guidelines on urinary tract infection in RACS. Asymptomatic bacteriuria does not need to be treated.

Feet and Footwear

Good practice points

- Assess if the older person has any foot pain or problems and if their footwear is safe and well-fitted.
- Facilitate access to a podiatrist for assessment and treatment of older people with foot conditions and foot pain.
- Encourage the older person to use safe, well-fitting footwear 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 use of safe, well-fitting footwear, as opposed to non-slip socks, as these are better for fall prevention.
- Support older people to take safe, well-fitting footwear with them when they leave the RACS, such as when transferred to hospital.

Syncope

Good practice points

- Ensure older people who experience unexplained falls or episodes of collapse, including pre-syncopal 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.
- When an older person is diagnosed with the cardio-inhibitory form of carotid sinus hypersensitivity, facilitate access to a medical practitioner to share decision-making with the older person about appropriate treatment options, 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.
- Review the older person's medicines regimen to identify medicines contributing to dizziness or postural hypotension, including but not limited to antihypertensives, antidepressants, anticholinergics and hypoglycaemics.
- Facilitate access to an appropriately trained medical practitioner or a physiotherapist who can assess and manage vestibular-related balance problems in the older person. Implement interventions for benign paroxysmal positional vertigo and vestibular rehabilitation when indicated.

Vision

Good practice points

- Facilitate access to eye examinations for the older person on commencement of care and annually.
- Ensure older people who use glasses (lenses) have accessible, clean glasses and wear them. If the older person has different glasses for reading and distance, ensure they wear their distance glasses when mobilising.
- When updating the older person's glasses, limit the change in prescription where possible. Advise older people and carers that extra care in undertaking activities of daily living is needed when using new glasses.
- Facilitate timely referral to a medical practitioner to share decision-making with the older person about 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.
- Ensure an occupational therapist conducts an environmental assessment and provides modification for older people with severe visual impairment.

Hearing

Good practice points

- Facilitate access to hearing assessment and management for the older person on commencement of care and annually. When undiagnosed hearing problems are identified, facilitate access to an audiologist.
- Ensure older people who use hearing aids have them within easy reach, that the older person wears their hearing aids when mobilising and that the hearing aids are working.
- Use hearing devices (such as a pocket talker 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.

Environment

Good practice points

- Provide orientation to the older person of the RACS environment on commencement of care, including the layout of the area and use of equipment such as call bells, walking aids and adjustable beds and chairs.
- Ensure that the older person's environment is reviewed and modified as part of a multifactorial approach in a fall prevention program.
- Facilitate the older person's access to an assessment by an occupational therapist and physiotherapist. This includes an environmental assessment and associated interventions, prescribing equipment, aids, devices and education for older people to maximise their safety and independence.
- Ensure procedures are in place to document, manage and escalate environmental causes of falls.
- Provide education for the workforce and the older person about environmental risk factors for falls, fall prevention and management strategies, and the safe and appropriate use of equipment to minimise harm from falls.
- Talk with the older person about options for the placement of their furniture and belongings to maximise their access to their living space and minimise their fall risk.
- Conduct regular reviews of all aspects of the older person's environment. This includes furniture, lighting, floor surfaces, contrasting fixtures, signage to maximise visual cues and wayfinding, clutter and spills. Modify environmental factors as necessary to reduce the risk of falls. Best practice is to combine environmental reviews with work health and safety audits.
- For new RACS builds and renovations to existing premises, follow the Guidelines on National Aged Care Design Principles.
- Ensure that the older person's environment conforms with Australian Standards AS3811 for hard-wired consumer communication and alarm systems for use in healthcare facilities.

Monitoring and Observation

Good practice points

- Agree with the older person on the use of monitoring and observation interventions such as sighting charts, alerts and devices and implement these strategies as part of a multifactorial fall prevention program.
- Provide regular monitoring and observation of an older person's transfers and mobility as part of a multifactorial fall prevention program.
- Ensure that older people living with dementia or delirium are frequently monitored and observed to manage their risk of falls and that appropriate resources are in place (including the workforce).
- Ensure that the RACS workforce is aware of the fall-risk status of each older person and what level of supervision each older person requires.
- Encourage carers and family to notify a member of the RACS workforce if the older person requires assistance.
- Identify appropriate resources (including workforce and support systems) for older people who are at higher risk of falling, including assisting those older people at higher risk of falling in the bathroom when required. Ensure policies are in place and roles are clearly defined.

Restrictive Practices

Good practice points

- When an older 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 older person to identify possible causes of changed behaviours. Treat or manage any causes of these behaviours, such as delirium or unmet needs, including pain, thirst, hunger or feeling hot or cold. Non-medicine strategies should be used as the primary strategies for managing changed behaviours. See the Clinical Practice Guidelines and Principles of Care for People with Dementia and the Delirium Clinical Care Standard.
- Develop a person-centred, effective behaviour support plan in partnership with the older person and their substitute decision-makers, carers and family to manage changed behaviours associated with cognitive impairment, including delirium. Focus on caring for the older person 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 older person or others. Follow Commonwealth aged care legislation on the use of restrictive practices and relevant national, local or state policies, procedures and regulations. See the Psychotropic Medicines in Cognitive Disability or Impairment Clinical Care Standard.
- If alternatives to restrictive practices are exhausted in addressing the changed behaviours, discuss options with the older person or substitute decision maker, explain the benefits and risks of the restrictive practice to be used and document informed consent if use is agreed upon. In an emergency, if consent is not obtained, follow appropriate regulations. Document the rationale for using restrictive practices and the anticipated duration and criteria for cessation agreed upon by the health practitioner and the multidisciplinary team.
- Continue non-medicine behaviour support strategies in the event a restrictive practice is used.

Hip Protectors

Recommendation

Hip protectors: Consider the use of hip protectors for older people to reduce the risk of fall-related hip fractures. (Level 2A)

Good practice points

- Prioritise older people who fall frequently, have osteoporosis or a low body mass index for consideration of the use of hip protectors to reduce the risk of fall-related fractures as part of a multifactorial approach.
- Provide information to older 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 as part of a fall prevention strategy, regularly check that the:
  - ☐ older person is wearing their hip protectors
  - ☐ hip protectors are in the correct position on the older person
  - ☐ hip protectors are not causing pressure on the older person's skin that may contribute to pressure injuries
  - ☐ hip protectors do not affect the ability of the older person to toilet independently
  - ☐ older person has not stopped wearing the hip protectors because of discomfort, inconvenience or another reason.
- Do not share hip protectors among older people, as they are a personal garment.

Vitamin D and Calcium

Recommendations

Dairy food provision: Ensure menus have at least 3.5 servings of dairy foods (milk, yoghurt, cheese) daily to meet the protein and calcium requirements of older people. Engage dietitians to assist with menu design that reflects dietary requirements and older people's needs and preferences. (Level 1B)

Vitamin D and supplements: Administer recommended doses of daily or weekly vitamin D supplements to all older people unless contraindicated. (Level 1A) Avoid monthly doses or yearly mega doses of vitamin D as they can increase the risk of falls in older people. (Level 2A)

Good practice points

- Monitor older peoples' nutritional needs, requirements and preferences and refer them to a dietitian if required.
- Facilitate access to a medical practitioner if an older person's dietary calcium intake is insufficient. The older person's medicines regimen should be reviewed when considering calcium supplementation with a maximum dose of 500 to 600 mg elemental calcium per day. There is concern that calcium supplementation increases the risk of cardiovascular events and has the potential to interact with certain medicines.

Osteoporosis

Recommendation

Osteoporosis medicines: Administer prescribed osteoporosis medicines for older people with diagnosed osteoporosis or a history of minimal trauma fractures, unless contraindicated. (Level 1A)

Good practice points

- Facilitate an osteoporosis assessment for all older people. Do not wait for a fracture to check for osteoporosis.
- Develop strategies for strengthening and protecting the older person's bones to reduce bone injuries from falls. This includes improving muscle strength, optimising functional capacity and improving the safety of the older person's environment.
- Establish protocols for the treatment of osteoporosis for older people who have sustained a minimal trauma fracture in partnership with the older person's medical practitioner.
- For older people with a history of recurrent falls, facilitate access to a bone mineral densitometry assessment / Dual Energy X-ray (DXA) scan to identify possible osteoporosis.
- For older people who are unable to be safely administered oral bisphosphonates, facilitate access to a medical practitioner to assess the appropriateness of a long-acting injectable medicine for the treatment of osteoporosis.
- For older people who are using medicines to treat osteoporosis, facilitate access to co-prescribed vitamin D with calcium, as directed by a medical practitioner.

Post-fall Management

Good practice points

- Provide post-fall response, clinical care and escalation immediately after an older person falls. Assess whether basic life support is needed and provide it as required. Complete a baseline assessment, including vital-sign observations and assess for injury. If the older person has hit their head, has new onset confusion, or if their fall was unwitnessed, undertake neurological observations. Determine the required type and frequency of monitoring of the older person. Consider other factors that may contribute to clinical deterioration, such as anticoagulant medicines, delirium and sepsis.
- Complete a comprehensive assessment, including a medication review, for every older person who falls. Use a structured tool to detect medicines that increase fall risk and identify medicines for deprescribing. Develop a multidisciplinary care plan that addresses comorbidities and fall risk factors to reduce the risk of another fall.
- Identify, investigate and report the cause of the fall by the older person and any injuries related to the fall. The fall investigation needs to include environmental, social and clinical causes, including medicines.
- Complete a post-fall analysis to inform an evaluation of the older person's multidisciplinary care plan and the fall prevention interventions. Address any identified comorbidities or fall risk factors and update the plan.
- At transitions of care, ensure communication of any falls or identification of fall risks with all relevant members of the older person's multidisciplinary team. See Principles for safe and high-quality transitions of care.
- Analyse falls data and delirium data to inform how changes to organisational practices and policies can prevent falls.
- Conduct an in-depth analysis of every fall in a RACS, particularly when there has been a serious injury or death following a fall.
- Ensure that training and education in post-fall management, reporting and documentation are provided to the workforce when appropriate.
- Report data on falls and falls with major injury to the Australian Government Department of Health and Aged Care through the National Aged Care Mandatory Quality Indicator Program.

3 Falls, falls injuries and risk factors

Falls are the leading cause of injury-related deaths across all age groups in Australia, with older people making up 94% of all fall-related deaths.[11]

In older people, fall-related injury is a leading cause of morbidity and mortality, with fracture of the hip being one of the most serious fall-related injuries.[11]

Older people often recover slowly from hip fractures and are susceptible to postoperative complications. In many cases, hip fractures result in death, and of those who survive, many never regain complete mobility.

Falls may increase the risk of complications, including the likelihood of developing a fear of falling or loss of confidence in walking, extending the length of stay in hospital, additional diagnostic procedures or surgery.

Many older people enter a RACS due to falls or injuries from falls at home. Falls are also a common reason for people requiring aged care in community settings.

3.1 Falls in RACS

The rate of falls in RACS is estimated to be 7.5 falls /1000 person days, with more than a third of these injurious falls (37%).[12]

One in five falls occurring in a RACS results in hospitalisation.[11] In 2019-20, men in RACS had five additional falls every 1000 person days compared to females.[12]

In RACS, fall rates vary according to case mix, which sees the rate of falls 33% higher in respite compared to older people living permanently in RACS.[12]

Injuries to the head (29%) and hip and thigh (20%) are the most common injured areas in older people hospitalised due to falls.[11] 58% of older people who fell in RACS injured their upper or lower limbs, and 37% injured their head or face.[12]

3.2 Characteristics of falls in RACS

In RACS, older people who are more mobile are at greater risk of falling than those who are immobile.

Fall rates in RACS were found to be highest in older people who could rise from a chair but could not stand unaided (81%) and lowest in those who could neither rise from a chair nor stand unaided (48%).[13]

A landmark observational study that used video to capture the circumstances of falls in RACS reported that the most frequent cause of falling was incorrect weight shifting (41% of falls), followed by trip or stumble (21%).[14] The three activities associated with the highest proportion of falls were forward walking (24%), standing quietly (13%) and sitting down (12%).[14]

3.3 Risk factors for falling in RACS

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 deterioration in capacities for activities of daily living, including oral health, are also risk factors for falls.

A person's risk of falling increases as the number of their fall risk factors increases.[15] In RACSs, older people who are more mobile are at greater risk of falling than those who are immobile.

Most fall risk factors can be addressed systematically to help prevent falls and harm from falls. Fall 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.

It is important that the RACS workforce knows how to identify and address fall risk factors to support routine and person-centred care for all older people in a RACS.

4 Involving older people in fall prevention

It is critical that 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. Improved health and wellbeing support older people to continue to participate in activities that are enjoyable and give life meaning.

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

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

Older people in Australia may experience greater challenges in accessing care due to geographical location, mobility, money and limitations in the availability of services and workforce. Virtual care strategies (e.g. 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.[4]
- Be aware that the term 'fall prevention' could be unfamiliar or difficult to understand for many people, and support the person's understanding through tailored communication.[16]
- Identify the older person's health literacy and individual communication needs and preferences, including consideration of any impairments in 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 own 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 the older person 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 to discuss their ongoing care needs and future medical treatment, including in relation to fall risk and develop or review advance care planning documents (if and when they choose).
- Ensure the older people living in RACS and their carers, family and substitute decision-makers know how to provide feedback and how to raise concerns.

4 Involving older people in fall prevention

Additional information

- What is person-centred care, 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.

5 Fall prevention interventions

Fall prevention is part of routine care in residential aged care services (RACS) and should be addressed in the individualised plan for daily care of every person in a RACS.

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

The interventions included in the guidelines have been shown to be successful in reducing falls in RACS and reducing the number of people who fall in RACS when included as components of a RACS multifactorial fall and fall harm prevention approach.

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

5.1 Choosing fall prevention interventions

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, with the combination of interventions tailored to the person based on an individual assessment.[8]

Fall prevention interventions have been shown to be much more effective in preventing falls and harm from falls in older people in RACS when implemented as a combination of interventions targeted at the individual's fall risk factors (multifactorial interventions).

5.1.1 Single interventions

Three fall prevention interventions have been shown to reduce the risk of falls and prevent harm from falls in some older people in RACS when implemented as a single intervention:[17]

- **Vitamin D supplements**: Administer recommended doses of daily or weekly vitamin D supplements to all older people unless contra-indicated (see Chapter 20). Avoid monthly or once yearly mega doses of vitamin D as they can increase the risk of falls.[18]
- **Tailored exercise:** Provide tailored supervised exercise to all older people who choose to participate. Ensure health professionals (e.g. physiotherapists or exercise physiologists) or appropriately trained instructors design and deliver the exercise programs. (see Chapter 7). Benefits of exercise are lost when structured exercise programs are ceased.
- **Dairy food provision:** Ensure menus have at least 3.5 servings of dairy foods (milk, yoghurt, cheese) daily to meet the protein and calcium requirements of older people. Engage dietitians to assist with menu design that reflects dietary requirements and older people's needs and preferences. (see Chapter 20).

5 Fall prevention interventions

5.1.2 Multifactorial interventions

Effective RACS falls and fall injury prevention programs use a combination of fall prevention interventions designed to address an older person's specific fall risk factors that are delivered together as a program of multifactorial interventions.

The importance of staff education in delivering successful multifactorial fall prevention programs is highlighted in studies that show that programs including staff education likely reduce the number of falls by people in RACS by 36% and the number of people falling by 22%.[4] Other key components from the successful trials included:

- multidisciplinary interventions[19]
- comprehensive geriatric assessment[19]
- balance exercises[19, 20] (see Chapter 7)
- medicines review[20] (see Chapter 9)
- environmental adaptations[20] (see Chapter 16)
- hip protectors (for preventing hip fractures)[19] (see Chapter 19)
- post-fall management (see Chapter 22).

5.1.3 Whole of organisation approach

The RACS workforce (relative to their scope of practice or role), including clinical, support services, management and corporate staff, have a role to play in fall prevention. Planned, intensive and sustained fall prevention programs supported by a whole of organisation approach led by RACS workers with associated work practice change will enable the best outcomes for older people in RACS who are at risk of falling.

Ongoing evaluation of prevention strategies with monitoring of falls using standard definitions (see Chapter 1) is crucial for determining the effectiveness of prevention strategies.

5.1.4 Cultural and linguistically diverse groups

There is some evidence that fall prevention strategies may work differently among culturally and linguistically diverse groups. Factors of difference include:

- Cultural differences in exercise preferences
- Risk of vitamin D deficiency
- Dietary intake of calcium from dairy products. [7]

Engaging older people and their carers and family (to the extent the older person chooses) in the assessment of fall risk will help identify cultural differences that should be considered in identifying appropriate fall prevention interventions to support the older person.

5.2 Implementing fall prevention interventions

5.2.1 Safe staffing and skills mix

Safe staffing levels and skills mix support good person-centred clinical care in the prevention of falls and harm from falls in RACS.

Successful fall intervention programs require considerable human resources and expertise to ensure they are completed safely and effectively. Appropriate staffing, quality equipment and timely education and training enable the success of fall prevention interventions. They should be factored into the design and implementation of those interventions.[21]

All RACS workers – including support, clinical, administrative and managerial staff, as well as the older person and their carers and family (to the extent the older person chooses) – have a role to play in fall prevention.

5.2.2 Individualised plan for daily care

Each older person has a unique set of fall risk factors and personal preferences, which require an individualised plan of action to minimise falls and harm from falls. Furthermore, the causes of falls are often complex, and people with multiple risk factors have a higher rate of falls than those with fewer risk factors.

To prevent falls, older people in RACS should be regularly assessed for their fall risk, with those factors that are identified as contributing to an older person's risk of falling addressed in an individualised plan for daily care.[19, 22]

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.

The guidelines provide suggestions on how fall prevention strategies can be implemented, by whom and at what point in time. As each RACS has unique features, the multidisciplinary team will need to make local decisions about how best to integrate fall prevention actions into an older person's plan for daily care.

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 RACS after fracturing her left inferior pubic ramus (pelvis). This injury was the result of a fall onto the floor while she was rushing to the toilet.

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

Information from the fall risk assessment and the accompanying transfer letter from the RACS revealed that she had multiple risk factors for falling, which included that she:

- is older than 65 years
- has fallen three times in the previous year
- is taking five different medicines, including a sleeping tablet and a diuretic
- completed a previous 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 to 79-year-old people is 15 seconds
- is frequently incontinent of urine at night and regularly rushes 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)
- has left foot pain as a result of severe hallux valgus
- wears bifocal glasses for all activities despite having a second pair of distance glasses for walking
- does not like to go outdoors and receives no direct sunlight.

When Ms R returned to the RACS, in addition to standard fall prevention strategies and in response to the multifactorial individual risk assessment, workers implemented targeted, individualised interventions to reduce Ms R's risk of falling.

These interventions included:

- a medicines review to minimise the likelihood of Ms R's medicine regime increasing her fall risk
- vitamin D supplementation 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
- encouraging attendance at fall prevention exercise classes designed and delivered 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 a minimised risk of medicine interactions and adverse medicine events
- has a 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 used 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.

5.3 Special considerations for cognitive impairment

Falls and cognitive impairment are key concerns for older people, health professionals and the RACS workforce 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 also benefit from fall interventions but will likely require individual tailoring of the interventions received.

For older people suffering from delirium or cognitive impairment, where it is unsafe for them to mobilise or transfer without assistance, individual observation and surveillance must be increased and help with transfers 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. There is evidence for the benefits of this approach from non-randomised controlled trials. [10]

6 Fall risk assessment for tailoring interventions

Recommendations

Multifactorial interventions: Provide multifactorial fall prevention interventions as part of routine care for all older people. This should include:

- regularly assessing both individual and RACS level fall risk factors, including assessment for environmental interventions and medicines review
- developing a tailored fall prevention plan based on the findings of the older person's fall risk assessment
- providing education and engaging the workforce about preventing falls and harm from falls in older people. (Level 1A)

6.1 Background and evidence

6.1.1 Fall risk in RACS

In residential aged care services (RACS), all older people should be considered at high risk of falls. This means that on commencement of care, all older people should be assessed for their risk of falling and risk of harm from falling to identify relevant fall risk factors and determine the appropriate multifactorial fall prevention interventions for that older person.

In other healthcare settings, people aged less than 65 years are screened on presentation for an increased risk of falling and to determine if a more detailed fall risk assessment is required. In RACS, screening is not applicable due to the high fall risk of older people.

6.1.2 Fall risk assessment in RACS

Fall risk assessment is used to identify underlying risk factors for falling. Fall risk assessment tools vary in the number of fall risk factors they include and how each risk factor is assessed.[23] Many fall risk assessments classify people into low and high-fall-risk groups.

A RACS may use a combination of fall risk assessment tools to ensure all fall risk factors are considered for every older person.

When a fall risk assessment tool is introduced into a RACS, it needs to be supported by education for workers and is regularly reviewed to ensure its use is appropriate and consistent. New workers should also receive education and training in the use of fall risk assessment tools as part of their induction training.

The fall risk assessment tools outlined in this document have demonstrated sufficient accuracy in predicting falls in most RACS settings for older people who fall and older people who do not fall in the period following a fall risk assessment. Many RACS have developed their own fall risk assessment tools, which are not validated for use in other RACS, given the variations in care settings.

Assessment is not a stand-alone action in fall prevention. Assessment needs to be linked to an individualised care plan for the older person to address identified fall risk factors. Even where risk factors for falling cannot be reversed, alternative strategies can be implemented to minimise the older person's risk of falling or harm from falling.

6.2 Principles of care

It is important that older people in RACS undergo a fall risk assessment upon commencement of care. Nursing staff are primarily responsible for completing fall risk assessments in RACS and consult with medical and other health professionals on the necessary fall prevention interventions and if any referrals for further action are required.

6 Fall risk assessment for tailoring interventions

Table 6.1: 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, De Morton Mobility Index, Berg Balance Scale, Short Physical Performance Battery, Berg Balance Scale. Physiotherapy assessment for walking aid use	Chapter 7
	Muscle weakness	Sit-to-Stand Test	Chapter 7
Cognitive impairment	Dementia or delirium	Psychogeriatric Assessment Scale, Folstein Mini-Mental State Examination; Rowland Universal Dementia Scale; Confusion Assessment Method; Impulsivity Behaviour Scale	Chapter 8
	Cognitive impairments in specific domains, including executive function	Montreal Cognitive Assessment Test, Trail Making Test	Chapter 8
Medicines	Benzodiazepines, antipsychotics, opioids and z-drugs	Medicines review	Chapter 9
	Specific serotonin reuptake inhibitors and antidepressants	Medicines review	
	Anticonvulsants and medicines that lower blood pressure	Medicines review	
	Some cardiovascular medicines	Medicines review	
Continence	Urinary and faecal	Questionnaires, assessment, physical examination	Chapter 10
Feet and footwear	Footwear analysis	Safe shoe checklist	Chapter 11
	Foot problems (i.e., bunions, corns) and deformities	Podiatrist assessment	
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	

6 Fall risk assessment for tailoring interventions

Risk factor	Components	Assessments	Detailed information
Vision	Visual acuity	Snellen eye chart, Landolt C, chart pictorial vision tests	Chapter 14
Environment	Impaired mobility, visual impairment	Environmental checklist	Chapter 16

Assessing fall risk in RACS should involve the use of a multifactorial assessment tool (or combination of tools) that covers a wide range of fall risk factors.

6.2.1 Fall risk assessment tools

In Australia, the most widely used fall risk assessment tool in RACS is the Peninsula Health Fall Risk Assessment Tool (PH-FRAT).

An alternative to these is the Care Home Falls Screen (CaHFRiS) assessment developed in the UK.[24]

6.2.2 Fall risk factors in RACS

In assessing an older person for their risk of falling and harm from falling, it is important to remember that most falls occur because of an interaction between intrinsic and extrinsic factors, and that multiple factors increase the risk of falls.

Fall 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.

Intrinsic and extrinsic fall risk factors

Many disease processes that are more common in older people increase the risk of falls, mainly through impairing postural stability.

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

Standing ability

Risk factors for falls in people in RACS who cannot stand unaided differ from risk factors for falls in people with good standing ability.[19]

For older people who cannot stand unaided, in addition to the fall risk factors outlined in this document, a fall risk assessment should focus particularly on:

- the cause of previous falls (if any)
- the level of care the older person is receiving, and
- medicine safety, with increased risk if using nine or more medicines.[19]

Specific fall risk factors

Some fall risk factors may require more specific assessments to inform the fall prevention interventions. Table 6.1 lists the specific fall risk factor assessments, with descriptions of these assessments provided in subsequent chapters.

6.2.3 Reassess an older person's fall risk after a fall

Older people should be reassessed for their fall risk following a fall as part of their fall risk management planning. These assessments aim to:

- identify the causes of the fall
- identify any resulting injuries
- reassess the older person's fall risk factors
- adjust the intervention strategies for the older person and
- avoid unnecessary transfer to hospital.

Some older people with poor insight into safety who have recurrent falls may not require a validated fall risk assessment as part of a post-fall management follow-up. Completing a fall incident form highlighting the current fall risk management strategies may be sufficient.

6.2.4 Results of a fall risk assessment

The outcomes of the fall risk assessment provide valuable information about an older person's fall risk. By systematically linking each fall risk to a fall prevention intervention and then implementing that intervention, the older person's fall risk can be reduced significantly.

Together with the recommended interventions and strategies to address the older person's identified fall risk factors, the results of the fall risk assessment need to be documented and reported to other health professionals and workers. The results should also be discussed with the older person and their carers and family (to the extent that the older person chooses).

Case study

Mr D, who lives in a low-level RACS, recently slipped and fell. He had substantial bruising but no broken bones.

As part of the RACS's routine policy after a fall, a falls risk assessment was undertaken to determine if there were any risk factors contributing to this fall. This assessment documented that Mr D had recently started taking sleeping tablets, had increasing unsteadiness in his walking and balance, and had a growing frequency of incontinence.

A review by the general practitioner resulted in trialling a non-medicines approach to improving sleep (including stopping afternoon naps and having his last coffee at lunchtime).

The physiotherapist introduced a supervised exercise program to improve balance and also provided Mr D with a walking stick to improve steadiness during walking.

Finally, a continence assessment identified strategies to improve Mr D's continence, and these were implemented. Four months later, Mr D had regained his previous mobility and confidence and had no further falls.

6.3 Special considerations for cognitive impairment

Identifying the presence of cognitive impairment in an older person in a RACS should form 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 make sure it is suitable for the older person, particularly if the older person has problems understanding one or more instructions.[25]

The desired fall prevention interventions may also need to be adjusted to suit older people with cognitive impairment.

6 Fall risk assessment for tailoring interventions

[Point of interest] Multifactorial interventions of falls prevention

A randomised controlled trial of a multifactorial intervention for falls in RACS included older people with cognitive impairment.[20] The multifactorial intervention included staff education, environmental modification, exercise, supply and repair of aids, medicines review, hip protectors, post-fall case conference and staff guidance. The trial used a fall risk assessment as a key element to guide interventions. A sub-analysis of older people with cognitive impairment found that this group had a significant reduction in falls-related injuries after the intervention was implemented.[26]

More recently, a multifactorial fall prevention intervention, the Guide to Action Care Home program, conducted in the UK significantly reduced falls.[21] Notably, 67% of the sample (n=1657) in this trial had dementia. The intervention was co-designed with RACS workers and older people and involved awareness raising, education, screening, and decision and implementation support around falls.[21]

Additional information

Commonly used fall risk assessment tools in RACS include:

- Peninsula Health Fall Risk Assessment Tool (PH-FRAT)
- Care Home Falls Screen (CaHFRiS)
- The World Falls Guidelines recommend a number of measures to assess the mobility and cognition of older people in RACS based on evidence and expert consensus.[22]

7 Balance and mobility

Recommendations

Tailored exercise: Provide tailored supervised exercise to all older people who choose to participate. Ensure health professionals (e.g. physiotherapists or exercise physiologists) or appropriately trained instructors design and deliver the exercise programs. (Level 1B)

Continued exercise: Provide continued exercise for fall prevention as the effect of structured exercise programs diminishes over time once the program has ended. (Level 1A)

7.1 Background and evidence

Balance is a complex skill in which the body's centre of mass is controlled within the limits of stability. This requires the integration of accurate sensory information such as vision, proprioception, and vestibular input, and a well-functioning musculoskeletal system to execute appropriate movements.

Coordinated muscle activity, strength and movements are required to maintain balance and prevent falling during the wide range of everyday mobility tasks, including standing, reaching, walking and climbing stairs.

7.1.1 Balance and mobility as risk factors for falling in RACS

Most older people in RACS have poor balance and mobility and limited strength. Increasing age, inactivity, disease processes and muscle weakness can impair balance.[27] Balance, mobility and strength are likely to further deteriorate if older people become less active and rely on assistance to perform activities of daily living rather than being supported to maintain their independence. These factors all contribute to the high rate of falls in older people at residential aged care services (RACS).[28, 29]

7.1.2 Improving balance and mobility with exercise

Systematic reviews have found that well-designed exercise programs can be of benefit to older people in RACS. Specifically, rehabilitation interventions can reduce disability in older people at the RACS long-term, with few adverse effects[30], and physical training can improve strength and mobility.[31, 32] Therefore, these interventions have the potential to prevent falls.

Two randomised controlled trials have reported that interventions including exercise significantly reduced the rate of falling in older people living in RACS.[20, 33] One trial, the Australian Sunbeam study described below[33]. The other included a multifactorial program that emphasised staff training and delivered interventions, including exercise, medicines review, environmental modification and assistive technologies based on individual risk assessments.[20] The benefits of exercise interventions in improving balance and mobility outcomes in older people in RACS are highlighted in the following studies:

- The Australian Sunbeam study used strength training gymnasium equipment in a 6-month program where a physiotherapist assessed each older person and prescribed an individual progressive resistance training plus balance exercise in a group setting, twice weekly for 1 hour with a further 6-month maintenance phase.[33] It improved physical performance as measured by the Short Physical Performance Battery among 221 older people from 16 RACS both in the first 6 months and the maintenance phases.
- A 6-month, individualised and progressive strength, balance and flexibility exercise program supervised by an exercise professional significantly improved performance in the Short Physical Performance Battery (SPPB) among 112 older people in Spanish RACS.[34]

- A 3-month, physiotherapist-prescribed balance, gait and flexibility program in RACS significantly improved balance (Berg Balance Scale) and gait (Dynamic Gait Index).[35]
- A trial of the Otago program (utilising ankle weights) improved lower limb strength (30-s Chair Stand Test) and balance (Berg Balance Scale), but not 6-minute walk times after 3 months.[36]

7.1.3 Exercise for preventing falls and harm from falls

Exercise, as part of a multifactorial falls prevention program for older people in RACS, has been shown to reduce the number of falls by 31% and the number of older people falling by 17% during or immediately following the end of the intervention (Appendix 3).

However, exercise that was not sustained had little or no lasting effect on the number of falls and the number of people falling when post-intervention follow-up periods were considered.

Furthermore, exercise as a single intervention made little or no difference to the rate or risk of falling.[9]

Effective combinations of exercise types in RACS

Effective trials of a combination of exercise types conducted in RACS include:

- A study in Australian hostels and retirement villages found 22% fewer falls among older people who attended weekly group exercise classes compared with those who did not.[37] The exercise program was conducted in weight-bearing positions and aimed to improve the ability of participants to undertake activities of daily living by including exercises that presented a high challenge to balance (e.g. single-leg standing) and that emulated the requirements of everyday activities.
- A trial in a RACS involved older people being seen by a research assistant up to four times a day for eight months.[38, 39] At each visit, older people were given a continence prompt and a supervised walk, asked to sit-to-stand, and encouraged to drink fluids. Additional upper limb resistance training was provided at tailored intensity, walking distance was gradually increased if possible, and sit-to-stand exercise was encouraged with minimal use of upper limbs for support. This program decreased the rate of falls by 38%.
- The Australian Sunbeam trial[31] (described above) reduced falls in older people in RACS by 55%. It is shown to be a cost-effective program[13] if the equipment is shared between RACS and the program is delivered by a single staff activities officer.
- A less resource-intensive intervention involving resistance bands, mats and exercise balls was used in a small trial conducted in Turkey to reduce the rate of falls during a program delivered in one-hour sessions three times weekly.[40]
- A small trial of the Otago program, which utilises ankle weights in addition to walking in three 45-minute sessions weekly compared to walking alone, was effective in reducing the rate of falls.[36]

7.2 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.

7.2.1 Assessing balance, mobility and strength

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

It is important to note that fall risk may not be directly related to poor strength and balance in older people living in RACS. Fall rates of older people in RACS have been shown to be:

- highest in those with fair standing balance
- intermediate in those with the best standing balance, and
- lowest in those with the worst standing balance.[13]

This nonlinear pattern was even more striking when older people were categorised according to their standing balance and ability to rise from a chair. Using this dual classification, fall rates over 18 months were highest in those who could rise from a chair but could not stand unaided (81%) and lowest in those who could neither rise from a chair nor stand unaided (48%).[13]

RACS multidisciplinary team members should consider these complexities when designing and implementing fall prevention interventions.

Tools to assess balance, mobility and strength in older people

Many measurement tools have been developed to assess balance, mobility and strength in older people in RACS. The different measurement tools are evaluated according to their reliability, validity and responsiveness to change. The choice of tool will depend on the time and equipment available.

Table 7.1 summarises the clinical assessment tools that may be helpful for measuring risk and assessing the balance, mobility and strength of older people in RACS. The criteria and ratings are derived from people living in the community setting.

7 Balance and mobility

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

Tools for assessing balance	
Functional reach[41]	
Description	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
Tools for assessing mobility	
Six-Metre Walk Test [42]	
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
Short Physical Performance Battery (SPPB)[43]	
Description	The SPPB is calculated from three components: the ability to stand up to 10 seconds in three ways, time to complete a 3-metre or 4-metre walk and time to rise from a chair five times.
Time needed	5 minutes
Level that is predictive of a fall	Score ≤ 6 points For scoring: https://sppbguide.com/
Timed up and Go (TUG) [22, 23]	
Description	TUG measures the time taken 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 (STS)[44]	

7 Balance and mobility

Description	STS is a measure of lower limb strength and is the number of stands from a seated position a person can complete in 30 seconds
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 [25]	
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.
Composite scales	
Berg Balance Scale [45]	
Description	The Berg Balance Scale is a 14-item scale designed to measure the balance of the older person 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)[46]	
Description	The DEMMI is a 15-item mobility scale that includes items that range 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)[47]	
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)[48]	
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 ≥ = high level of concern [7]

7.2.2 Elements of an effective exercise program

Key features recommended for an effective exercise program to reduce falls and harm from falls by older people in RACS include:

- exercises targeting balance and strength
- individualised exercise prescription
- moderate-intensity exercise
- sufficient funding to support older people to exercise.[49]

The World Falls Guidelines recommend that exercise programs involve health professionals who are trained in fall prevention and that, where possible, an exercise specialist such as a physiotherapist or exercise physiologist should be consulted to provide specialist-tailored advice on exercise and physical activity.[10]

Seated exercise also has benefits as it may improve physical and cognitive functions and well-being in older people in RACS.[50, 51]

Multifactorial fall prevention interventions for older people in RACS involving exercise as well as workforce education, an assessment of environmental factors and medicines safety reduced the number of falls by 36% and the number of people falling by 22% (Appendix 3).

Importance of education

Education of the workforce in fall prevention and management is a key feature of an effective multifactorial fall prevention program, as education ensures that fall prevention interventions are implemented systematically and appropriately. It is also important that the workforce engages with the older person and their carers and family (to the extent the older person chooses) in explaining the outcomes of the fall risk assessment and associated fall prevention interventions.

Exercise progression

Multifactorial fall prevention interventions that emphasise slowly increasing the amount of exercise and/or increasing the resistance involved in resistance training have positive effects in reducing fall rates of older people in RACS. A program involving training and feedback, information and education for older people, environmental adaptations, hip protectors and twice-weekly exercise in groups of six to eight people, delivered by exercise instructors, decreased fall rates by 45%.[22] Exercises included progressive balance exercises and progressive, individually tailored resistance training with ankle weights and dumbbells.

Case study

Mr K is 88 years old and returned to his RACS after being in hospital for pneumonia. The hospital discharge summary noted that Mr K could no longer stand up from his bed without help.

As part of a multifactorial falls prevention program, the physiotherapist reviewed his balance, mobility and strength, and designed a program of supervised exercises that could be carried out with the RACS workforce and Mr K's family.

As a result, Mr K can now stand without help and is more stable when walking, and his family are more confident about helping him when required.

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.[52-54] 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).

Reasonable adjustments should be used to provide older people with cognitive impairment access to the same fall prevention interventions as other older people. Simplifying instructions and using picture boards and demonstrations are strategies that may improve the quality of exercise for people with cognitive impairment. Family, carers and volunteers may be able to help in supervising and motivating older people with cognitive impairment who are undertaking exercise programs.

Exercise programs for older people with cognitive impairment, which include balance training, are beneficial in preventing falls and associated harm. A 12-week group exercise program including strength, balance, endurance, and flexibility exercises involving older people in a RACS with a diagnosis of dementia showed a reduction in falls during the program.[55] The Sunbeam trial also prevented falls in older people in RACS with mild to moderate cognitive impairments.[56]

7 Balance and mobility

Additional information

- The Physiotherapy Evidence Database (PEDro) provides evidence-based information from randomised controlled trials, systematic reviews and evidence-based guidelines in physiotherapy.
- NSW Fall Prevention and Healthy Ageing Network provides resources on exercises designed for older people in RACS
- Fitness Australia provides information about local activities and fitness services that could be appropriate for older people in RACS.

8 Cognitive impairment

8.1 Background and evidence

Many older people in residential aged care settings (RACS) have cognitive impairment. Although cognitive impairment is strongly associated with increasing age, it is a complex area 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 or executive function. It is not synonymous with dementia.

Dementia

Dementia is a major neurocognitive disorder.[57] 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. The cognitive deficits must not be better explained by another disorder, such as delirium or depression.[57]

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.[11] There is a high prevalence (50–70%) of older people with dementia in RACS.[58]

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. Dementia is commonly accompanied by changes in personality, behaviour and social cognition.[59]

Delirium

Delirium is a syndrome characterised by the rapid onset of variable and fluctuating changes in mental status.

While there are relatively few studies on the prevalence of delirium in RACS, it is estimated that delirium occurs in 60% of older people in RACS at some time.[59] Older people with existing cognitive impairment are more likely to develop delirium associated with an acute illness.[59] It is crucial that delirium is diagnosed rapidly and treated early.[60]

Delirium is a medical emergency that may need a period of hospitalisation to manage both the underlying precipitant and the manifestations of delirium. 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.[59]

Dementia or delirium

Differentiating between dementia and delirium can be difficult, and the two conditions can coexist.

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 more than three medicines.[59]

The prevention of delirium is more effective than early detection and treatment.[61] 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.[62] 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.

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.[63] For example, impairments of gait and balance are worse in older people with cognitive impairment,[52, 64] psychotropic medicines are more commonly prescribed[64, 65] and orthostatic hypotension and hypotension are more prevalent.[66]

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[64, 67, 68]
- reduced dual-task ability[69]
- for some with greater cognitive decline and preserved mobility, an increased tendency to wander[70-72]
- fear of falling, which is relatively common in people with cognitive impairment, with some studies reporting a prevalence of more than 50%.[73]

Table 8.1 details the fall risks associated with cognitive impairment.

8 Cognitive impairment

Table 8.1: Fall risks 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
Changes in environment	Changes in the environment can contribute to changed behaviours such as confusion and agitation.[74] These behaviours may subsequently increase the risk of falls.[74] Changes in the environment include: ■ transfers between hospital and a RACS ■ transfers within or between rooms within a RACS.
Medicines	Psychotropic medicines are more commonly prescribed for older people with cognitive impairment and have been associated with an increased fall and fracture risk.[75-77]
Orthostatic hypertension	Orthostatic hypotension is more prevalent in 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.[66, 78]
Depressive symptoms	Depressive symptoms have been independently associated with falls in community-dwelling older people with cognitive impairment.[77, 79, 80]
Specific types of cognitive impairment	Specific types of cognitive impairment appear to affect fall risk through different mechanisms[80, 81] For example: ■ People with Vascular and Lewy body dementia have significantly poorer gait and functional performance compared to older people with Alzheimer's disease[82] ■ Vascular dementia is associated with a higher incidence of orthostatic hypotension[83] ■ Lewy body dementia is associated with symptomatic postural hypotension and a higher incidence of orthostatic hypotension[84]
Global cognition	Even though global cognition does not appear to be associated with fall status among older people with cognitive impairment,[80] it confers a moderate to high risk of serious fall-related injury.
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 [53, 77]
Balance, mobility and gait	As with cognitively healthy older people, impairments in balance, mobility and gait [23,26,33] and lower levels of physical activity have been associated with falls in older people with cognitive impairment.

8 Cognitive impairment

8.1.2 Cognitive impairment and fall prevention

While successful multifactorial fall prevention programs in RACS have included older people with and without cognitive impairment, there is limited evidence that multifactorial interventions specifically reduce falls in older people with cognitive impairment.[22, 39, 85-87]

Fall prevention in RACS

A subgroup analysis of the Sunbeam exercise trial in RACS revealed that the intensive progressive resistance and balance exercise training program was effective in reducing falls and fall risk in older people with mild to moderate cognitive impairment.[56]

In addition, an Australian 12-week intervention comprising strength, balance, endurance and flexibility exercises enrolled older people with dementia and did reduce the risk of falls by 52%, although it did not improve mobility.[55]

Some studies have shown that interventions can modify certain risk factors for falls in older people with cognitive impairment, such as gait performance,[25] balance[25, 88] and mobility.[25]

8.1.3 Behaviour support plans

In Australia, 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.[89] This includes older people with cognitive impairment.

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. Behaviour support plans must be reviewed and updated as behaviour changes are observed or occur and to reflect any new information that is received about the older person.

8.2 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.

8.2.1 Assessing cognitive impairment

One of the most important initial steps in preventing falls in older people in RACS is to assess the older person for cognitive impairment.

Generally, in a RACS, a registered nurse is responsible for assessing the older person's cognitive status and can supervise the collection of information on which the assessment is based. This information can include baseline observations, urinalysis, changes in medicines, pain, blood sugar level, constipation and dehydration. Every RACS should have a delirium protocol for collecting this baseline information.

An assessment for cognitive impairment should include the following strategies:

- **Check regularly for the presence of dementia or delirium**, as the rapid diagnosis and treatment of delirium and its underlying precipitant (e.g., infection, dehydration, constipation, pain) are crucial.[60, 61]
- **Review the older person's medicines** for combinations that may contribute to an alteration in cognitive status.
- **Treat possible medical conditions** that may contribute to an alteration in cognitive status.
- **Conduct a detailed assessment** of older people who have a progressive decline in cognition to determine diagnosis and, where possible, treat reversible causes.[90]
- **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.

8 Cognitive impairment

Some interventions, such as exercise, require the older person to be able to follow instructions or comply with a program. Where the older person has difficulty following instructions safely, the multidisciplinary team should tailor the fall prevention plan to ensure that the plan is as effective as possible.[91]

Where relevant, the multidisciplinary team should refer to the older person's behaviour support plan to inform any fall prevention interventions and update the behaviour support plan accordingly.

Tools for assessing cognitive impairment

The more common cognitive screening tools for use in RACS are summarised in Table 8.2.[92-95]

The Rowland Universal Dementia Scale (RUDAS) is a simple tool designed for use in multicultural populations like Australia.[96, 97]

For remote living Aboriginal and Torres Strait Islander peoples, the Dementia Guidelines recommend the use of the Kimberley Indigenous Cognitive Assessment, an assessment of cognitive function developed specifically for Aboriginal and Torres Strait Islander peoples. However, the quality of evidence is low.[98]

The World Falls Guidelines[10] recommend that cognitive screening tests include executive function components such as the Montreal Cognitive Assessment (MoCA)[99] or specific executive function tests such as the Trail-Making Test Part B.[100]

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

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

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

8 Cognitive impairment

Folstein Mini-Mental State Examination (MMSE)[101]	
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.[100]
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
Rowland Universal Dementia Scale (RUDAS)[96, 97]	
Description	RUDAS is a simple method for detecting cognitive impairment. RUDAS is valid across cultures, portable and administered easily 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
Confusion Assessment Method (CAM)[102]	
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. an altered level of consciousness, i.e. other than alert
Time needed	5 minutes
Criterion	The older person is diagnosed as delirious if they have both the first two features and either the third or fourth features.
Accuracy	94% sensitivity; 90% specificity
Fall-related Impulsive Behaviour Scale (FIBS)[68]	
Description	The FIBS contains four simple questions that can be answered by care staff relating to an older person's impulsivity in conducting activities, i.e. rushing while attempting to sit down, stand and walk without assistance.
Time needed	<5 minutes
Criterion	Score ≥ 1
Accuracy	Older people with FIBS scores ≥1 have 2.92 times increased odds of falls (95% CI: 1.03–8.29)

8 Cognitive impairment

Montreal Cognitive Assessment (MoCA)[99]	
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: orientation, attention, memory, visuospatial abilities, language and executive function. There are adapted versions for people who are not literate or have limited years of education and 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
Trail-Making Test for Screening, Part B[100]	
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 and 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 by the overall time (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 for a person with cognitive impairment to be addressed as part of a multifactorial fall prevention program.

In developing a fall prevention program, consider the older person's ability to follow instructions safely and ensure any additional support they may need to understand or follow the program and communicate this to the 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:

- Educate and discuss fall prevention risks and strategies with the workforce and older people and their carers and family (to the extent the older person chooses).[22, 103] Holding post-fall case conferences with the workforce may be helpful in supporting the older person to reduce the risk of further falls.[22]
- Encourage all older people to participate in individualised exercise programs or exercise classes to improve muscle strength, balance, gait, safe transfers and use of walking aids.[22, 39, 55, 56, 85, 98]
- Implement strategies to ensure that mobile older people can walk around safely, such as:
  - ☐ ensuring walking aids and other assistive devices are appropriate and repairing them as needed [85, 86]
  - ☐ modifying the environment to maximise safety [22, 85, 86]
  - ☐ ensuring hip protectors are worn correctly [22, 85]
- Review prescribed medicines for conditions where the risk to the older person exceeds the benefit. For example, antidepressants, antipsychotics, antihypertensives and antianginals.[85, 86]
- Assess and develop a care plan for older people with urinary incontinence.[39]
- Treat orthostatic hypotension as required. Orthostatic hypotension is common in older people with dementia.
- Eliminate the inappropriate use of restrictive practices or immobilising equipment, including indwelling catheters.[91]
- Provide supervision and assistance to ensure that older people with delirium or cognitive impairment who are not capable of standing and walking safely receive help with all transfers.[104]
- Use fall-alarm devices (sometimes called movement alarms) to alert workers that older people with cognitive impairment are attempting to mobilise.[91]
- Assess the adequacy of Vitamin D and calcium in the older person's diet and consider supplementation.

8.2.3 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 in RACS:

- 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 playing music.

- Promote companionship if appropriate.
- Establish orientation programs using environmental cues and supports, including having personal or familiar items available. Repeat orientation and safety instructions on a regular basis, keeping instructions 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. Make sure the workforce knows about the schedule so that procedures, routines and the older person's environment can be kept consistent.
- Encourage sleep without the use of medicines and promote and support uninterrupted sleep patterns by maintaining a bedtime routine, 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 cognitively impaired older people, 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, repeat and paraphrase, and allow time for the older person to process the information to help 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 used strategies developed by the Joanna Briggs Institute Practical Application of Clinical Evidence System to maintain oral hydration in older people living in RACS.[105] Although adherence was problematic, the following recommended strategies may be beneficial:

- Drinks such as cordial, juice and water, but not caffeinated drinks, were offered by workers every 1.5 hours as well as at 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.

8 Cognitive impairment

Case study

Ms A is a 79-year-old person living in RACS. She has been diagnosed with Alzheimer's disease. Ms A entered care at the RACS recently when her family was no longer able to care for her at home. Ms A often wanders and gets lost.

Workers have been instructed to provide supervision of her mobility, orientation and safety instructions to Ms A on a regular basis, keeping instructions clear and consistent. Her family was asked to bring some personal and familiar items from home to have in her room. To reduce her risk of an injury, Ms A was offered soft-shield hip protectors, which she has been wearing. Workers are checking that Ms A is wearing the hip protectors daily and that they are comfortable.

These interventions have supported Ms A to be settled and comfortable at the RACS and have fewer episodes of confusion.

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 confused people in hospital, NSW Agency for Clinical Innovation
- Allies in Dementia Health Care Project provides resources for allied health professionals supporting older people with dementia, 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
- Dementia Outcomes Measurement Suite is a compendium of validated tools for the assessment of various aspects of dementia by health professionals at the Australian Dementia Centre for Research Collaboration
- Dementia Training Australia provides resources for consumers and health professionals on dementia, helping to translate dementia research into practice.
- Montreal Cognitive Assessment

9 Medicines and Medicines Review

9.1 Background and evidence

Epidemiological studies have shown an association between medicines use and falls in older people.[106-112] [1-7] The risk of falls can be increased by medicines interaction, undesired side effects (such as dizziness) and the desired effects of medicines (such as sedation).

Medicines use in residential aged care services (RACS) is commonplace. The following statistics are associated with older people living in RACS:

- 98% take at least one form of medicines[113]
- 63% take four or more medicines[113]
- 61% take one or more psychotropic medicines regularly[114]
- 22% take antipsychotics regularly[114]
- 22% take benzodiazepines regularly[114]
- 41% take antidepressants regularly[114]
- 83.6% are prescribed psychotropic fall-risk-increasing medicines[12]
- 77.3% are prescribed cardiovascular-disease fall-risk increasing medicines[12]
- Between 35%-70% are potentially inappropriately prescribed medicine – that is, the overuse, misuse or underuse of medicines.[115, 116]

It is important that RACS workers and the whole multidisciplinary team recognise that older people can have different 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 aging 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.[117] 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.

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.[12, 118-120]

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

Table 9.1 presents the various medicine classes and discusses their relationship with fall risk.

9 Medicines and Medicines 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,[12] and are associated with an increased risk of a fracture from a fall.[121-123] There is an increased risk of falling while taking these medicines, compared with not taking them, of between 25% and 90%.[120]
Benzodiazepines	Benzodiazepines are strongly associated with falls.[119, 124] Older people using other medicines, particularly antidepressants, are more likely to start using benzodiazepines.[125]
Antipsychotics	Antipsychotic use is associated with an increased risk of falls.[120] Despite fewer extrapyramidal side effects, fall risk is still associated with atypical antipsychotic agents (including 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 medicine class to increase fall risk.[118] However, the effect size for falls is likely to be modest, given the inconsistencies in the association of the medicines with falls.[118]
Beta-blocking agents	Beta-blocking agents demonstrate mixed results in regard to fall risk, including the potential for a protective effect on fall risk,[118] no impact on fall risk[12] and an increase in fall risk.[118]
Loop diuretics	Loop diuretics are significantly associated with an increased risk of falls, likely due to their rapid diuretic effect compared to other diuretics.[118]
Antihypertensive medicines	Antihypertensive medicines have been associated with an increased risk of serious fall injuries, particularly in those people with previous injurious falls.[126] Thiazides have been found to increase fall risk, particularly in the 3 weeks following the first prescription.[127] The risk of hip fracture may also be increased with the use of antihypertensives in the first 7-45 days following prescription.[128, 129]
Other Medicines	
Opioid	Opioid use is associated with an increased risk of falls, as well as fall injuries and fractures among older people.[117, 119, 130] Side effects of opioids, such as sedation, dizziness and cognitive impairment, may account for this association.[119]
Anticonvulsant medicines	Anticonvulsant medicines are associated with an increased risk of falls.[119]
Anticholinergic medicines	There is conflicting evidence for the risk of falls and anticholinergic medicine use.[117, 131-133]
Other	Other types of cardiac medicines, antacid medicines[134] and analgesic agents[119] 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.[135] 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.[106, 107, 119, 136] 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 medicines) can be as high as 1.4, increasing to 2.2 for older people using two medicines and 2.4 for people using three or more medicines.[107]

Multiple medicine use may be partly a proxy measure for poor health in an older person.[137]

9.1.2 Behaviour support plans

In Australia, 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.[89] A behaviour support plan may include medicine prescribed as a chemical restraint.

Behaviour support plans must be reviewed regularly. If a chemical restraint is used, a medicines review will ensure medicines that are no longer required can be identified and reduced or stopped .[89]

9.1.3 Evidence for interventions

A medicines review should be a core part of the assessment of older people in RACS[37]. It should be completed on entry and regularly for those who have repeat prescriptions. Some RACS may have access to an aged care onsite pharmacist who can undertake a medicines review in collaboration with the older person's general practitioner.

The focus of a medicines review should be on appropriate prescribing – that is, checking that medicines are used safely and effectively, and that other forms of treatment or management are considered as alternatives, if possible.

The Fit fOR the Aged (FORTA) list is a medicine classification system used to evaluate the appropriateness of medicines for older people and may improve the quality of the medicines prescribed and reduce the risk of falling.[138, 139]

Evidence to support a medicines review

A medicines review by a pharmacist as a single intervention in RACS has been shown to lower the rate of falls, including in older people with dementia.[140, 141] Nearly 33% of medicines that were discontinued as part of the intervention were central nervous system medicines, and close to 60% of medicines initiated were calcium or vitamin D.

The rate of falls in older people in RACS was also reduced when medicines review was part of a multifactorial fall intervention program where fall risk-increasing medicines were adjusted to minimise adverse effects.[85, 86, 142, 143]

The provision of a pharmacist transition coordinator in transitioning older people from the hospital to an RACS can improve the quality of medicines prescribing.[143]

Education of medical practitioners on inappropriate prescribing in RACS has shown some benefits, with an educational program followed by on-demand phone support improving the use of inappropriate medicines, antipsychotics and medicine duplications in older people in RACS.[144]

9 Medicines and Medicines Review

9.2 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.

9.2.1 Reviewing medicines

Medicines review in RACS should ensure that the benefits of medicines outweigh the risks. Reviews of an older person's medicines should be undertaken on entry to the RACS, annually, after a fall, and after initiation or escalation in dosage of medicines.[145]

A review of the older person's medicines by a pharmacist or doctor is required if the older person has one or more of the following: [146]

- is taking more than 12 doses of medicine a day
- is taking one or more psychotropic medicines
- is taking four or more different types of medicines
- has multiple medical conditions
- is suspected of not adhering to their medicine regime
- has symptoms that suggest an adverse medicine reaction (e.g., confusion, dizziness, reduced balance)
- is attending a number of different doctors, both GPs and specialists
- was discharged from an acute care facility in the previous four weeks
- has had significant changes to the medicine regimen in the past three months
- has had a change in medical conditions or abilities (including falls, cognition, physical function)
- has had a prescription of medicine with a narrow therapeutic index or requiring therapeutic monitoring
- has had a subtherapeutic response to treatment
- has had suspected nonadherence or problems with managing medicine-related therapeutic devices
- has a risk of inability to continue managing their own medicines (e.g. due to changes in dexterity, confusion or impaired sight).

On commencement of care, older people are entitled to a Residential Medication Management Review (RMMR). Additional RMMRs can be requested by the older person's medical practitioner, such as when there is a significant change in the older person's medical condition or medicine regimen.

The World Falls Guidelines recommend an assessment of falls history and the risk of falls before prescribing potential fall-risk-increasing medicines to older people.[10] The use of a validated, structured screening and assessment tool to identify fall risk-increasing medicines is also recommended when performing a general review or medicines review targeted to falls prevention.[10]

9.2.2 Providing interventions

The following strategies help to ensure the quality use of medicines and are good practice for minimising falls:

- Review medicines as part of a comprehensive assessment of an older person's risk of falling.
- Provide the older person and their carers with information about newly prescribed medicines or changes to prescriptions.
- Polypharmacy should be limited to reduce side effects and interactions, and a tendency towards proliferation of medicine use.
- Prescribe the lowest effective dosage of a medicine specific to the symptoms.
- Medicines that act on the central nervous system, especially psychotropic medicines, are associated with an increased risk of falls and should be used with caution and only after weighing up their risks and benefits.

- Alternatives to medicines that act on the central nervous system (e.g., psychosocial treatments) to manage sleep disorders, anxiety and depression should be tried before pharmacological treatment. For example, group education and relaxation training may successfully reduce benzodiazepine use for sleep disturbance.[147]
- Consider non-medicine strategies for behaviour support planning, promoting sleep, addressing anxiety, depression and pain. Psychotropic medicines should only be considered when the changed behaviours are causing significant distress or risk of harm to the person or others. Document the purpose and the plan for review.
- Provide support and reassurance to older people who are gradually stopping the use of psychotropic medicine(s).
- 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, as the risk of falling is greatest during this period.[148]
- If the older person needs to take medicines known to increase the risk of falls, try to minimise the effects (i.e., drowsiness, dizziness, confusion and gait disturbance).
- Increase the awareness of the multidisciplinary team regarding medicines associated with an increased risk of falls.
- Document information in line with policies and procedures when implementing, evaluating, intervening, reviewing, educating and making recommendations about the older person's medicine use.

The World Falls Guidelines recommend that falls prevention strategies should always include rational deprescribing of medicines that increase fall risk for older people living in long-term care, such as RACS.[10]

Case study

Mr F is an 80-year-old man with dementia and changed behaviours living in a RACS. Nurses became concerned about his mobility after his return from hospital, where he was admitted with a chest infection and associated delirium. His walking had slowed and he was generally stiff.

A medicines review was undertaken as part of a comprehensive review to understand why Mr F's walking had deteriorated. It was identified that he had been started on an antipsychotic for his behaviour, but it was now causing Parkinsonian features.

After a discussion with the general practitioner (GP), a plan was put in place to wean Mr F off the antipsychotic. A referral was made to a specialist behaviour response team, which advised on reviewing Mr F's behaviour support plan, including non-pharmacological strategies to manage his behaviour.

After cessation of the antipsychotic, Mr F's mobility improved. The medicines review also identified that Mr F was not on any treatment for bone health despite a previous minimal trauma fracture. The GP started vitamin D supplementation and treatment for osteoporosis, and RACS workers encouraged Mr F to increase his oral calcium intake.

9.3 Special considerations for cognitive impairment

People with cognitive impairment may have difficulties taking medicine, and some older people will require medicine supervision. Prescribers should aim to keep medicines regimens simple and, where possible, keep the frequency of medicines intake to a maximum of daily or twice daily.

People with cognitive impairment may have trouble understanding information and instructions or communicating, which can affect the reliability of a subjective assessment of an older person's ability to understand the need for their medicines. The multidisciplinary team should pay special attention to changed behaviours and nonverbal cues in people with cognitive impairment.

Dementia medicines

There is evidence that dementia medicines cholinesterase inhibitors and memantine do not significantly increase the risk of falls in older people with cognitive impairment; however, cholinesterase inhibitors may increase the risk of syncope.[149]

Multifactorial interventions in preventing falls for people with cognitive impairment

A significantly lower incidence rate of falls was observed in a study investigating the effectiveness of a multifactorial intervention in preventing falls in psychogeriatric RACS older persons. Intervention components included anticipating circumstances and precursors of falls, reviewing and modifying medicine, providing individualised exercise programs and assessing the older person's need for protective aids.[150]

Additional information

- National Medicines Policy
- National Strategy for Quality Use of Medicines
- Quality Use of Medicines
- 1300 Medicine (1300 633 424) is a free Australian Government-funded service staffed by registered pharmacists
- Pharmaceutical Society of Australia (PSA)
- 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
- Residential Medication Management Review Consumer Medicine Information (CMI)
- Position paper on how to implement and execute the World Falls Guidelines recommendations on polypharmacy and fall risk-increasing drugs in clinical practice.[138]
- Psychotropic Medicines in Cognitive Disability or Impairment Clinical Care Standard.
- Principles of safe and high-quality transitions of care

10 Continence

10.1 Background and evidence

About 66% of older people in residential aged care services (RACS) experience urinary incontinence and require support for bladder management.[151] About 72% of older people in RACS require support for bowel management.[151]

While urinary and faecal incontinence affect both males and females, it is not usually considered to be part of the normal ageing process.[152] However, age-related changes within the urinary tract do predispose older people towards urinary incontinence.[153]

Managing incontinence appropriately has been shown to improve urinary incontinence symptoms in older people and may improve overall care.[154] Managing incontinence as part of an older person's multifactorial fall prevention intervention can reduce the risk of falls and harm from falls.[155, 156]

10.1.1 Incontinence associated with increased fall risk

Urinary incontinence in frail older people is universally multifactorial and is directly linked to fall rates in this population.[153] In RACS, urinary incontinence, nocturia (urge to urinate at night), assisted toileting and urinary frequency are associated with an increased risk of falls and fall-related fractures.[29]

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.[157]

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.

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

Bladder symptoms
Nocturia is defined as being woken at night by the desire to void. Nocturia is common and is significantly associated with an increased risk of falls and fall-related fractures among older people.[158] 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.
Urge (urinary) incontinence is defined as involuntary urine leakage accompanied or immediately preceded by urgency. Urinary incontinence is associated with an increased risk of falls and fractures.[159] A larger volume of urine lost through incontinence is also associated with a greater risk of falls.[160] Regardless of continence status, older women's walking speed and stride width are reduced when experiencing a strong desire to void.[158] 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 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.[161]

Bowel symptoms

Constipation may cause delirium and agitation, which may, in turn, predispose an older person to falling.

Constipation is a common problem in older people. It 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.[162] Relieving constipation improves lower urinary tract symptoms, including urinary incontinence.[163]

Diarrhoea may cause agitation as well as metabolic disturbance, which may, in turn, predispose an older person to falling.

Incontinence fall risk factors in RACS

While numerous falls in RACS 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.[164]

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.
- Urinary incontinence is a significant risk factor for falls in older people who cannot stand unaided.[165]
- 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.[166]
- 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 adds to the likelihood of falls at night.

10.1.2 Incontinence and fall prevention in RACS

There is limited evidence that continence care directly prevents falls in older people in RACS; 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.[29, 156]

Pelvic floor muscle training

The most recommended and most effective intervention for women with stress incontinence is pelvic floor muscle training.[167] Men may also benefit from pelvic floor muscle training. A continence adviser, gynaecologist or physiotherapist can assist older people in the treatment of mixed and urge incontinence, and in 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 RACS and can reduce the risk of falls.[39] The three types of toileting assistance programs, timed voiding, habit retraining and prompted voiding, are outlined in Section 10.2.2.

10 Continence

Continence management

A pelvic floor muscle training program combined with a balance and mobility exercise training program was shown to be effective at improving urinary incontinence symptoms as well as balance and gait in older women with urge urinary incontinence.[168] An active toileting-management plan combined with low-intensity exercise improved functional outcomes and urinary and faecal continence for older people in a RACS.[39]

10.2 Principles of care

Given that older people are often reluctant or embarrassed to discuss issues around continence, the RACS workforce should enquire openly and routinely about incontinence symptoms rather than rely on the older person to raise the topic.

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 worker of the same sex as the person.[169]

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 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.

10.2.1 Assessing continence

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.[170] The following strategies can be used to assess and interpret the older person's continence status:

- **Obtain a continence history**, 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.[171]
- **Use simple, validated questions** with the older person to help differentiate the type of urinary incontinence they have.[172]
- **A bowel assessment** may be required to determine 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 a suitably qualified health professional should conduct.
- **Post-void residuals** should be checked in older people with incontinence.[173]
- **Functional considerations**, such as reduced dexterity or mobility, 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 RACS.

The suggested strategies below are adapted from those recommended by the 6th International Consultation on Incontinence 2018[174] and should be used to promote continence in RACS:

- Ensure that 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.

10 Continence

- 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 workers in the RACS.
- Address all comorbidities that can be modified.
- 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 own continence status and to 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 as described above are not working or if the older person is keen to learn 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 the use of continence aids as a trial management strategy.

Case study

Mr W lives in a RACS. He cannot stand and adjust his clothes when going to the toilet without losing his balance and wetting his clothes. The use of a urinal was trialled but resulted in similar incidents.

A detailed assessment and management of Mr W's continence was undertaken and a toileting strategy was implemented where Mr W was prompted to go to the toilet every two hours. A physiotherapist assessed Mr W's balance and mobility and recommended Mr W join a twice-weekly small group balance and strength class supervised by the physiotherapist. Together, these multifactorial interventions have improved Mr W's mobility, incidents of urinary continence and his independence with toileting safely.

10.3 Special considerations for cognitive impairment

Regular, proactive toileting is recommended for older people in RACS 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,[175] 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.

Additional information

- The National Continence Helpline (1800 33 00 66) is a free service provided by the Continence Foundation of Australia. The helpline is staffed by nurse continence advisers who provide confidential information on incontinence, continence products and local services. A range of resources on continence-related topics are available, including resources for Aboriginal and Torres Strait Islander peoples and translations into 14 languages.
- A Best Practice Model of Continence Care for Residential Aged Care provides the characteristics of quality continence care for older people, National Ageing Research Institute
- The National Public Toilet Map provides information on toilet facilities along travel routes throughout Australia. The map can be accessed via the website. Printed copies of maps of toilets along planned journeys can be obtained by calling the National Continence Helpline (1800 33 00 66).
- The Continence: Caring for Someone with Dementia fact sheet was developed by Dementia Australia
- Evidence-based guidelines on managing urinary incontinence, developed by the United Kingdom's National Institute for Health and Clinical Excellence (NICE)
- Australian Government Department of Health and Aged Care, Pelvic floor muscle training for men
- Guidance on the management of asymptomatic bacteriuria to reduce inappropriate antimicrobial prescribing in RACS Australian Commission on Safety and Quality in Health Care
- Aged Care Quality and Safety Commission resources on urinary tract infections:

11 Feet and footwear

11.1 Background and evidence

Foot problems are a contributing factor to mobility impairment and 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 fall risk factor for older people in (RACS).[19, 176, 177] Many older people wearing inappropriate footwear believe the footwear to be adequate; however, about 75% of 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.[177]

Multifactorial fall prevention interventions that incorporate appropriately fitted and safe shoes or footwear for the older person result in a demonstrable reduction in falls.[19]

Footwear associated with increased fall risk

Footwear can increase the risk of falls in different settings for a range of reasons:[178]

- Poorly fitting footwear or footwear that is inappropriate for the environmental conditions can impair foot position sense.[179]
- Wearing shoes with inadequate fixation to the foot (i.e. shoes without laces, buckles or velcro fastening) is associated with an increased risk of tripping.[177]
- Wearing high-heeled shoes impairs balance compared with low-heeled shoes or being barefoot.[179, 180]
- Medium high-heeled shoes and shoes with a narrow heel significantly increase the likelihood of sustaining all types of fracture.[181]
- Slip-on shoes and sandals increase the risk of foot fractures because of a fall.[181]
- Slippers and non-slip socks are often the indoor footwear of choice for many older people but are associated with an increased risk of injurious falls.[182]
- Walking barefoot or in socks is associated with a 10-13-fold increased risk of falling.[181]

11.1.1 Appropriate footwear to reduce fall risk

Footwear assessment is a common and effective fall prevention strategy used in RACS.[182] Appropriate footwear can improve the mobility, balance and gait of an older person in RACS and reduce the risk of falling. Older people should be encouraged to wear appropriately fitted shoes whenever mobilising.

Table 11.1 outlines the shoe characteristics recommended as safe for older people in preventing falls and harm from falls.[181]

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.

Other footwear that has been shown to be beneficial in reducing the risk of falls in older people includes:

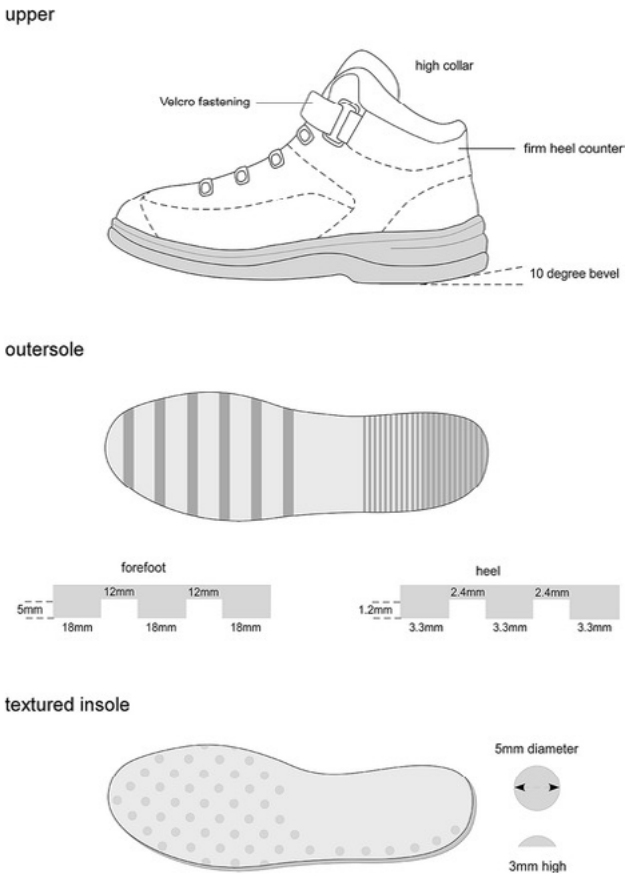
- Athletic shoes are associated with the lowest risk of falling.[181]
- High-collar shoes may be beneficial for balance during walking.[180]

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: Theoretical 'safe' shoe to optimise balance in older people: Menz183



11.1.2 Foot problems

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.[184] Women report a higher prevalence of foot problems than men, which might be influenced by fashion footwear.[183] The most commonly reported foot problems are:

- pain from corns, calluses and bunions
- foot deformities, such as hallux valgus, hammer toes and nail conditions.[185-187]

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.[187]
- 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.[184, 188, 189] Podiatry may help manage these conditions.[190-192]
- Ageing is associated with reduced peripheral sensation, with older people who experience falls performing worse in tests of lower limb proprioception,[193] vibration sense[194] and tactile sensitivity.[195]
- Reduced plantar tactile sensitivity, particularly in older people with diabetes,[196] may be a risk factor for falls[188] because it might influence the person's ability to maintain postural control when walking, particularly on irregular surfaces.[195]
- People with diabetic neuropathy have impaired standing stability[197] and are at increased risk for falls and fractures.[197]
- Cancer survivors with chemotherapy-induced peripheral neuropathy also report impaired foot sensation, which in turn impairs their balance and stepping and increases their risk of falls.[198] There is growing evidence that exercise is an effective strategy to reduce symptoms and improve balance and mobility in this clinical group.[199]

11.1.3 Podiatry interventions to improve function and reduce falls

Multifactorial fall prevention interventions focused on feet and footwear have been effective in reducing falls in older people. Most evidence to support this comes from research focused on community-dwelling older people; however, the fall risk factors and podiatry interventions are the same as those experienced in RACS.

11 Feet and footwear

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 were effective in reducing falls and harm from falls in older people with disabling foot pain.[200, 201] Contributing factors likely included 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 shown a significant reduction in fall rates in older people.[202]

Footwear interventions, including shoe insoles and foot orthoses, can significantly facilitate improvements in balance and gait in older people through a combination of mechanical and sensorimotor mechanisms, which may translate to the prevention of falls.[203] Textured and vibration insoles had the greatest effects.[204]

11.2 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.

11.2.1 Assessing feet and footwear

An older person's feet and footwear should be assessed as part of RACS pre-entry screening or upon entry into care into a RACS and assessed routinely following entry to care. This assessment should be done by a health professional skilled in the assessment of feet and footwear. 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.[205, 206]

Assessment of footwear

The safe shoe checklist is a reliable tool for evaluating specific shoe features that could potentially improve postural stability in older people.[207]

Assessment of foot problems

An older person should be assessed for foot pain and other foot problems regularly.[208]

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.

Suspected distal sensory loss

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

A recent study investigating the threshold for monofilament size for fall risk assessment in older people suggested that the 4.31 monofilament is the best filament to detect the risk of falls among older people in terms of tactile sensory loss.[208]

A podiatrist assessment

A detailed assessment by a podiatrist for a fall-specific feet and footwear examination should include: [36]

- **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 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

The RACS workforce 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
- ensuring that older people with urinary incontinence have dry, clean footwear
- ensuring older people have more than one pair of shoes in case shoes are soiled or damaged
- discouraging older people from walking while wearing slippery socks and stockings
- ensuring older people who wish to wear socks wear nonslip socks, which can reduce the risk of slipping when walking on polished floorboards and improve gait performance[209, 210]
- discouraging the use of talcum powder inside RACS, 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

Ms V lives in a RACS, has difficulty with her balance and wears loose-fitting slippers. The registered nurse discussed the benefits of wearing well-fitting footwear. With Ms V's consent, the nurse ordered a new pair of fitted footwear from their local provider.

As part of a multifactorial approach to reduce Ms V's risk of having another fall, she was also referred to supervised exercise classes. After one month, Ms V reports a considerable improvement in her balance and is able to walk longer distances.

11.3 Special considerations for cognitive impairment

Older people with cognitive impairment may not be able to report discomfort reliably. Therefore, when checking the footwear of older people, their general practitioner or other member of the multidisciplinary team should 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 that the older person chooses).

In a dementia-specific setting, RACS workers provided terry cloth slipper socks, incorporating a rubber anti-slip tread, to older people at bedtime, which saw a reduction in falls.[211] This protocol was adopted to reduce the risk of older people with dementia slipping in urine.

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 Complictions Program
- The Australasian Podiatry Association provides details of practitioners visiting rural and remote areas in each state and territory. http://www.podiatry.org.au/
- 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 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 who live in the community has been reported as 6.2 per 1000 person-years.[212] Equivalent figures for older people living in residential aged care services (RACS) do not exist. 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.[213]

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.[212]

Vasovagal syncope is often preceded by pallor, sweatiness, dizziness and abdominal discomfort, although these features are not always seen in the older person. [1] Commonly reported precipitants of vasovagal syncope include prolonged standing (particularly in hot or confined conditions), fasting, dehydration, fatigue, drinking alcohol, acute febrile illnesses, pain, venepuncture 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. Older people also need to be reassured that vasovagal syncope is a benign condition.

12.1.2 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.[214]

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 be lying 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 in itself 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 for 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.[215-218]

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.[219]

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.[220]

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

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

12.1.4 Cardiac arrhythmias

Abnormal rhythms of the heart can lead to dizziness and syncope, with atrial fibrillation independently associated with falls and syncope in older people.[221]

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 reducing or ceasing 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 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.

12 Syncope

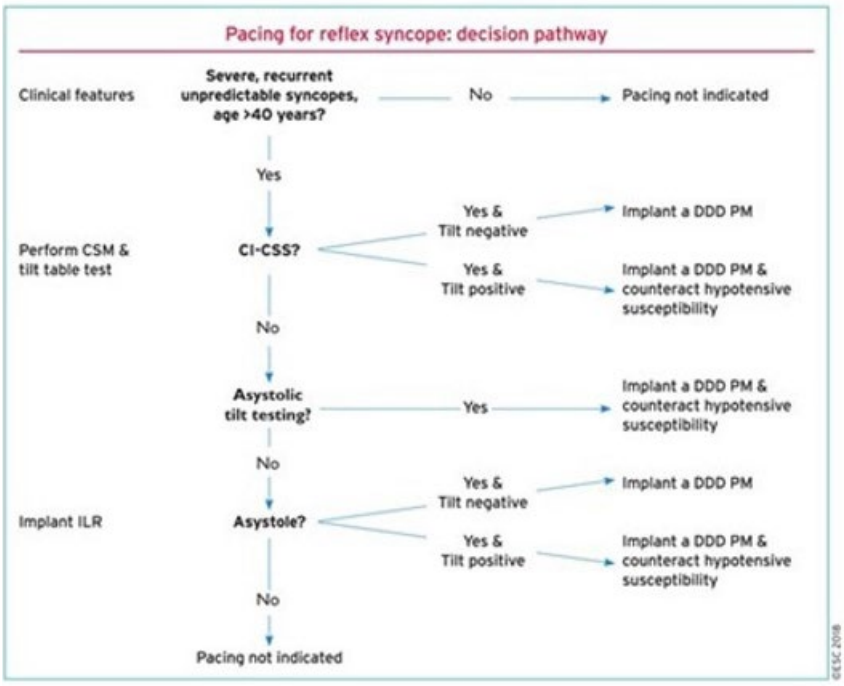
12.2.1 Assessing syncope

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

The older person's symptoms should be evaluated by their general practitioner. Depending on the history and results of the clinical examination, certain tests and investigations may be warranted. These include an electrocardiogram, echocardiography, tilt-table testing, carotid sinus massage,[222] continuous non-invasive orthostatic blood pressure measurement[223] and insertion of an implantable loop recorder.

The European Taskforce on Syncope has produced a simple algorithm for investigating syncope.[214]

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 Syncope

12.2.2 Treating syncope

Permanent cardiac pacing is successful in treating certain types of syncope. Pacemakers may reduce falls for people with cardioinhibitory carotid sinus hypersensitivity.[224, 225]

Successful multifactorial fall prevention strategies in the community and hospital settings for older people with syncope have included assessments of blood pressure and orthostatic hypotension and medicines review and modification.[106, 108, 155, 226-228]

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

- Ensure good hydration is maintained, particularly in hot weather.
- Encourage the older person to sit up slowly from lying, stand up slowly from sitting and wait a short time before walking.
- Minimise exposure to high temperatures or other conditions that cause peripheral vasodilation, including hot baths.
- 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.
- Monitor and record postural blood pressure.

Case study

Ms B is an 89-year-old woman living in a RACS. She has hypertension and has had a stroke, which left her with speech impairment and the need for assistance with activities of daily living. RACS workers reported to the registered nurse that when they helped Ms B out of bed to go to the bathroom, her legs had given way. Ms B's carers felt that if they had not supported her, she would have fallen to the floor.

The registered nurse measured Ms B's lying and standing blood pressures and found that her blood pressure on standing dropped more than 20 mm Hg (systolic). This was reported to her general practitioner, who reviewed Ms B's medicines, including her antihypertensive agent. The dose of her antihypertensive was reduced. RACS workers were encouraged to monitor that Ms B's fluid intake was sufficient and that she was provided with additional prompting to drink on a regular basis throughout the day.

The RACS nurse manager reviewed the policy and reminded registered nurses to initiate a medical review if an older person is identified as having light-headedness or dizziness related to postural hypotension. RACS workers are now careful to identify when older people are dizzy and have implemented several new strategies to assist older people in maintaining their hydration, such as ensuring all older people have a full glass of fluid with medicines and regular drink breaks.

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 typical symptoms of orthostatic hypotension, such as dizziness, and instead present with mental fluctuations and confusion, drowsiness and slow falls.[229] Orthostatic hypotension should be considered as a differential diagnosis to ensure early diagnosis and treatment.

Orthostatic hypotension is common in people with vascular dementia, and many 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.[79]

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, 2019: 74(19), 2410-2423.
- Fainting and collapse fact sheet – Safer Care Victoria

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 is common in all age groups, but its prevalence increases markedly with age.[230, 231] Dizziness is a significant contributor to disability in middle-aged and older people.[232]

Dizziness in older people often represents a difficult diagnostic problem because it is a subjective sensation that may result from impairment or disease in multiple systems.[231, 233-235] The underlying cause of dizziness is unknown in 8-23% of people reporting symptoms of dizziness, with the single most common diagnosis for dizziness being benign paroxysmal positional vertigo (BPPV).[235-237]

When older people describe being 'dizzy', 'giddy', or 'faint', this may mean anything from anxiety or fear of falling to postural disequilibrium, vertigo or presyncope; a detailed patient history is crucial.

Dizziness has been associated with older people falling in residential aged care services (RACS).[238] Poor sensorimotor function, impaired balance control, anxiety and neck and back pain have been identified as mediators of the relationship between dizziness and falls.[239] Older people with dizziness are also at high risk of experiencing fall-related fractures.[240]

13.1.1 Vestibular disorders associated with an increased risk of falling

Peripheral vestibular disease is a common cause of dizziness in older people, with age-related changes in the vestibular system prevalent in people older than 70 years.[236-244] These changes include asymmetrical degenerative changes, which may contribute to falls by impairing balance control and providing inaccurate information about the direction and size of head or body movements.

Older people with vestibular dysfunction who are clinically symptomatic have a significantly increased risk of falling,[241] with vestibular dysfunction found to be more prevalent in fallers versus non-fallers in community-dwelling older people.[245, 246]

People with BPPV often have balance problems; however, more research is needed to identify whether there is an association between older people with BPPV and their risk of falling.

A higher incidence of falls is associated with older people who have increased variability in their perception of the postural vertical, as assessed with a tilt platform.[242] Poor perception of the postural vertical is an indicator of vestibular (otolith) function without visual input and with reduced somatosensory feedback.

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 RACS 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.[244] Vertigo, a subtype of dizziness, is highly characteristic of vestibular dysfunction and is generally described as a sensation of spinning.
- **Conduct a medicines management review.** Many medicines have dizziness-related side effects.

13 Dizziness and vertigo

- **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.[247]
- **Consider other causes of dizziness if symptoms are not improving,** such as a migraine or persistent postural-perceptive dizziness, and refer onwards, where appropriate, to a neurologist or vestibular physiotherapist as indicated.

Table 13.1 outlines interventions that can be used to assess vestibular function. These may involve referral to a suitably qualified health professional outside the RACS.

Table 13.1: Interventions that can be used to assess vestibular function

Intervention	Use in assessing vestibular function
Halmagyi head thrust test	The Halmagyi head thrust test assesses peripheral vestibular function.[248] The head thrust test only has good sensitivity if the vestibular dysfunction is severe or complete.[249]
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 BPPV and be treated/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.[250-252] Note, Dix–Hallpike testing should not be used in people with an unstable cardiac condition or a history of severe neck disease.[253] Dix-Hallpike can be modified for older people with other comorbidities.[254]
Vestibular function tests	Vestibular function tests evaluate the integrity of the peripheral (inner ear) and central vestibular structures. These tests are available at some specialised audiology clinics and may be recommended if symptoms persist.[247]
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.[250]
Medical imaging	Computed tomography (CT) or magnetic resonance imaging (MRI) can identify an acoustic neuroma or central pathology.[255]

13.2.2 Assessing dizziness

To improve dizziness symptoms 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.[235]

Unfortunately, there is not enough evidence to validate the use of diagnostic tests to evaluate dizziness in the RACS setting.[256] The evidence presented below is from the primary care setting and is relevant to the RACS setting.

Seven-item sum score as a predictor of dizziness-related impairment

One study found that by examining easily obtainable clinical information about seven factors over a 6-month period, researchers could predict which older people had persistent dizziness-related impairment.[257] These factors included:

1. chronic dizziness
2. standing still as a dizziness-provoking circumstance
3. trouble walking or (almost) falling as an associated symptom
4. polypharmacy
5. absence of diabetes mellitus
6. having an anxiety or depressive disorder
7. 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.

Simultaneous diagnosis and prognosis approach

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.[258]

The Dizziness Handicap Inventory and the seven-item sum score[257] could be used to identify if the older person is at risk of persistent impairment and then identify and treat the 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 RACS 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.

An example of a multifactorial tailored approach that has shown to be effective in treating dizziness-related impairment in older people was comprised of one or more of the following:

- a physiotherapist-led vestibular rehabilitation program
- an 8-week internet-based cognitive-behavioural therapy
- a 6-month home-based exercise program
- medicines management.[235]

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

Medical management

Vertigo symptoms and balance

Anti-vertigo medicines combined with vestibular rehabilitation training is effective and safe and can alleviate vertigo symptoms and improve balance in patients with vestibular neuronitis.[259]

Nausea and vomiting

Treatment with antiemetics and vestibular suppression medicines may be required to treat the unpleasant symptoms associated with nausea and vomiting. These medicines should only be used for a short duration (one to two weeks) because they adversely affect the process of central compensation after acute vestibular disease.[260]

Treating benign paroxysmal positional vertigo (BPPV)

Table 13.3 outlines a range of treatment options for BPPV.

Table 13.3: Treatment options for BPPV

Treatment	Description
Brandt and Daroff exercises	Brandt and Daroff exercises are simple exercises that can be done regularly and are designed to break up any material collecting in the ear canal that may be affecting a person's balance.[261]
The Epley manoeuvre	The Epley manoeuvre is highly successful for treating BPPV.[262, 263]. It involves taking the older person slowly through a range of positions that aim to move the freely mobile otoconia back into the vestibule. A modified Epley manoeuvre is effective at treating posterior canal BPPV.[264]
BBQ Roll or Gufoni manoeuvre	BBQ Roll or Gufoni manoeuvre should be used to treat older people with horizontal canal BPPV. These or other appropriate manoeuvres should only be undertaken by a vestibular physiotherapist.[265]
Vitamin D supplementation	A course of vitamin D supplementation has been shown to reduce the rate of annual recurrence of BPPV attacks by 24% in older people with frequent attacks of BPPV.[26637]

It is important to diagnose and treat BPPV as soon as possible because treatment reduces dizziness and improves general wellbeing.[266]

Older people with diagnosed BPPV respond as well to treatment as the general population, even though they require more canalith-repositioning procedures to treat their BPPV.[267] However, poor outcomes, including poorer dynamic balance recovery and increased self-perceived level of handicap, are apparent in older people compared to younger people.[268]

Symptoms of BPPV with absence of nystagmus

Older people with symptoms on a Dix-Hallpike or BBQ Roll test in the absence of nystagmus should be treated sparingly using the appropriate manoeuvre.

If there is a continued absence of nystagmus and no improvement in symptoms over the course of two sessions, the older person should be referred onwards to a neurologist, as central vestibular impairments can present as BPPV.

If the older person is not improving after two to three treatments for BPPV, the clinician should refer to a vestibular physiotherapist.

Vestibular rehabilitation

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

- **Physiotherapy intervention** focuses on minimising an older person's complaints of dizziness and balance problems through a series of exercises, which are modified to suit each person.[269]
- **Occupational therapy intervention** involves incorporating the movements required to do these exercises into daily activities.[270]
- **Psychology input** addresses the emotional impact of vestibular dysfunction.[271]

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.[272]
- A supervised program of VR can be provided in RACS to address safety and cognitive issues specific to this setting. Successful outcomes have been demonstrated with supervised VR provided once a week[273] as well as three to five times per week.[274]
- Delayed initiation of VR is a significant factor in predicting unsuccessful outcomes over time.[275]

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

Case study

Ms P is an 87-year-old woman who lives in a RACS. She requires help with personal care activities, such as showering and dressing, and has had several recent falls. Ms P dislikes lying flat in bed and now sleeps with the head of her bed elevated. She avoids rolling over and requires light assistance to get out of bed in the morning.

Her visiting general practitioner requested that Ms P be tested for benign paroxysmal positional vertigo (BPPV). Dix-Hallpike testing identified this condition in her right inner ear.

Following treatment using an Epley manoeuvre, Ms P reported that she feels more stable on her feet and uses only two pillows at night. She has had no further falls since having her BPPV treated.

13.3 Special considerations 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 at risk of falling.[276]

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.
- Dizziness Handicap Inventory
- The Royal Australian College of General Practitioners has information on:
  - ☐ Brandt-Daroff Exercises for patients
  - ☐ Epley Manoeuvre

14 Background and evidence

14.1 Background and evidence

Vision loss is a common chronic condition in older people.[277] Older people in residential aged care services (RACS) often have more significant visual impairment than the general population.[278, 279] The leading causes of visual impairment for older people are:

- Cataracts, which are potentially reversible
- Age-related macular degeneration, which is irreversible.[278, 280]

14.1.1 Visual functions associated with increased fall risk

Vision is a key sensory input for maintaining balance and avoiding falls related to obstacles in the environment. Older people rely disproportionately more on visual information than on proprioceptive or vestibular input for balance control.[281]

Studies have shown that:

- Impaired visual acuity,[282] reduced contrast sensitivity,[283-285] poor depth perception[286] and reduced visual field size[282, 287-290] are all associated with an increased risk of falling.[291]
- In the presence of ocular disease, reduced visual acuity is an independent risk factor for recurrent falls in older people in RACS.[292]
- Fear of falling is more frequently reported in older people with visual deficits.[293, 294]
- Many medicines are associated with visual disturbances, which may contribute to falls. Medicines side effects include blurred vision, double vision, cycloplegia (loss of accommodation), changes in colour perception, lens opacities and halo vision.[277]
- Older people who wear bifocal or multifocal glasses lenses when walking outside and on stairs have a decreased ability to negotiate steps safely[295] and a two-fold risk of falls from tripping.[284]

14.1.2 Eye conditions associated with an increased fall risk

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

Cataracts

Visual changes resulting from cataracts are associated with a 2-3-fold increased risk of falls in older people with cataracts compared to those without.[296] 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.[297]

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[298] and ability to detect obstacles and navigate through cluttered environments.

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 are also positively associated with glaucoma severity.[299]

Falls occur more commonly in those with greater visual impairment due to their glaucoma,[288, 298] particularly in the inferior field region.[300]

Macular degeneration

Macular degeneration can cause loss of central vision depending upon disease severity and is associated with impaired balance[301] and increased risk of falls[302] and injurious falls.[303, 304]

Diabetic retinopathy

Diabetic retinopathy can reduce visual field size and may increase the risk of falls.[305]

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

14.2 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

The following strategies can be used to measure vision problems in older people in RACS:

- 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, an inability to read (including avoiding reading) or watch television, and 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.[287, 288]
- Arrange regular eye examinations for the older person to reduce the incidence of visual impairment[306], which is associated with an increased risk of falls.[287]

RACS workers 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 Background and evidence

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 size. 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 m 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)[307]	
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 indicates visual impairment and a score of less than 1.0 indicates visual disability.
Confrontation Visual Field Test[308]	
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, one on either side of the vertical, and each hand has either 1 or 2 fingers extended, 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 again and then recorded. If the participant moves the fixation to view the peripheral targets, repeat the presentation. Results are recorded as finger counting fields R√ and L√ if the participant correctly reports the number of fingers presented. For those who fail this screening, a diagram should be drawn to indicate in which part of the field the participant made an error.

Confrontation Visual Field Test[308]	
Time needed	4 minutes
Criterion	If the participant incorrectly reports the number of fingers held up in either eye, they should be referred for a full visual field test.

14.2.2 Providing interventions

Research in the community setting about reducing fall risk through vision intervention may also be applicable to RACS. Interventions that could be used are suggested below.

Cataract surgery

Cataract surgery has been shown to be effective in reducing falls in older people, with timely cataract surgery for each eye optimising vision in older people with cataracts, as well as reducing fall risk.[307-312]

There is evidence that older people on waiting lists for cataract surgery are at an increased risk of falls and fractures.[309, 310] While waiting for surgery, these individuals may benefit from environmental safety interventions to address potential hazards, lack of equipment and risky behaviours that predispose people with severe visual impairment to falls.

Health professionals should refer to the Cataract Clinical Care Standard, which describes best practice for the care of cataracts.

Referral to an ophthalmologist

Facilitate access for the older person to an eye specialist when:

- a new visual problem is detected
- there is no identifiable reason for poor vision
- they are wearing scratched glasses
- their glasses that do not fit comfortably
- they have not had an eye examination in the past year.[227]

The strategies outlined in 14.2.1 Screening Vision should be implemented before a referral to an ophthalmologist is made.

Optimal prescription

If the older person wears glasses, ensure the older person's prescription is correct and facilitate access to an optometrist if their visual acuity is worse than 6/7.5.

If an older person requires new glasses, it is recommended that optometrists gradually change the lens prescription and counsel the older person as to the likely short-term risks of a new prescription, including increased risk of falling.[313]

If an older person regularly goes outside, it is recommended that they wear tinted single-vision distance glasses when negotiating stairs or walking in unfamiliar surroundings, as bifocal and multifocal glasses are related to an increased risk of falling outside and on stairs.[314]

Safety assessment and modification of living space

Occupational therapists can provide safety assessments of an older person's environment to help older people modify their behaviours and environment to allow them to live more safely and reduce their risk of falling.[315]

Environmental modifications have been shown to be effective in preventing falls in RACS as part of multifactorial fall prevention programs.[22, 85, 86] Interventions that improve visual cues and minimise environmental hazards should be used. This includes ensuring the provision of adequate lighting and contrast by applying adhesive strips for steps or painting the edges of pathways white.[316, 317] See Chapter 16.

Exercise-based fall prevention programs

Exercise programs that are adapted for people with visual impairment and delivered by trained instructors have been found to be feasible and acceptable in preventing falls and harm from falls in older people with visual impairment in RACS.[318, 319]

[Point of interest] Mobility training

Vision Australia specialises in providing safe mobility training for visually impaired people.

Case study

Mr G is an 84-year-old man who lives in a RACS. Recently, he tripped and fell on a step. He said that he did not notice the step and that his vision seemed to be growing fuzzier.

Mr G was referred to an optometrist to check that he was wearing the optimum glasses correction for distance vision. The optometrist diagnosed that the cause of Mr G's vision loss was macular degeneration.

In discussion with Mr G and his partner, the RACS implemented measures to provide a safe environment for Mr G to walk around to minimise any trip hazards and maximise his safety. This included ensuring that his room was properly lit at all times. Mr G now has a light by his bed, and his walking frame is always positioned by the bedside at night because he tends to get up at night to go to the toilet. Mr G was also given information about fall prevention and instructions about mobilisation. He was encouraged to call for help when he did not feel confident walking outside of his room. RACS workers have made sure that Mr G has supervision when negotiating steps.

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.
- 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 and 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:

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.[320-322] Hearing impairment has been associated with decreased quality of life and independently associated with walking difficulties, impaired cognition, functional decline and social isolation.[320, 323-327]

15.1.1 Hearing impairment as a fall risk factor

Hearing impairment is known to contribute to falls in older people.[320, 324, 328-330]

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

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, spilling liquid, etc.).[320, 324, 329, 330]
- People with hearing impairment require more attention for detecting and processing 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.[248] Thus, if generalised inner ear dysfunction occurs due to disease or degeneration, both hearing and balance impairments would follow.
- Poor hearing may lead indirectly to falls by reducing a person's participation in activities with subsequent muscle deconditioning and decreased health-related quality of life.[324]

15.1.2 Fall prevention interventions related to hearing impairment

Fall prevention interventions for older people in residential aged care services (RACS) related to hearing impairment include:

- regular hearing examinations, with access to an audiologist, when hearing problems are undiagnosed
- access to a pocket talker – a device that amplifies sound closest to the listener while reducing background noise
- wearing of hearing aids that are working, especially when mobilising.

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

Hearing is important for communicating and understanding:

- an older person's needs and preferences
- a care plan and the associated interventions
- how to mobilise safely around the RACS
- how to participate in exercise and social activities as desired.

For older people with hearing impairment in RACS, addressing hearing loss, as per the good practice points at the start of this chapter, and ensuring working hearing aids are within easy reach for an older person with hearing impairment should form part of routine care.

15 Hearing

The multidisciplinary team should adjust their communication approach to accommodate the needs of the older person with a hearing impairment to ensure that fall prevention interventions are as effective as possible. For example, an older person with hearing impairment may:

- find it difficult to understand verbal instructions
- require more concentration than other older people to ensure their concerns or opinions are understood
- tire more easily in environments or situations where listening is challenging, such as in a room full of people or where the television volume is loud.

[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.

Case study

Ms M, aged 88 years, was identified as having significant hearing impairment on commencement of care at the RACS. As she was not able to easily communicate with workers, she was offered the use of a pocket talker (a device that amplifies sound closest to the listener while reducing background noise) to support communication. The RACS facilitated Ms M to see an audiologist for the fitting of hearing aids.

Ms M now uses the hearing aids when conversing with others and mobilising. Now able to hear clearly, Ms M understands what she needs to do to mobilise safely and is participating in a range of social activities in the RACS.

Additional information

Hearing Matters Australia - https://www.hearingmattersaustralia.org/

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

16 Environment

16.1 Background and evidence

Many falls involve poor lighting, clutter, uneven or slippery floors or unsafe behaviour, such as using unstable furniture as a walking aid.

An audit of the quality and safety of the physical environment in Australian residential aged care services (RACS) showed that identified fall risk areas in RACS are most frequently related to signage, visual perception and lighting, and outdoor areas.[331] A cohort study of older people receiving home care services found that the risk of falling increases by 19% for each environmental hazard identified in the home.[332]

Environmental hazards as fall risk factors in RACS

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

Environmental hazard assessment and reduction considers how the older person functions within their environment and what behavioural and environmental factors need to be addressed to reduce the risk of falls.

Hazard reduction involves:

- an initial assessment of the older person's fall history and circumstances and the older person's vision and mobility
- checking the older person's room in the RACS for hazards that might cause them to fall
- checking the older person's immediate surroundings, such as the canteen and gardens, for hazards that might cause them to fall, and
- modifying the environment or adapting behaviours to remove or minimise these hazards.

Environmental hazards can occur:

- within the RACS, such as electric cords running across floors, poor lighting, loose carpets or mats
- within the garden, such as slippery grass or paths or uneven ground
- away from the RACS, such as public fall hazards such as uneven footpaths or poor lighting in public areas.

Higher-risk individuals in RACS

Non-ambulatory people and people with cognitive impairment, incontinence and impaired gait may be at higher risk of falls or harm from falls from additional or different environmental factors in a RACS compared to the general RACS population.

16.1.1 Environmental factors as part of a multifactorial intervention

Safe walking areas are essential in a RACS environment for older people to safely mobilise. Flooring, lighting and seating in both internal and external areas should be considered in creating safe walking areas in a RACS.[4]

A simulated community environment in an enclosed and safe area that incorporates a walking track with a bench and bus stop sign can be useful for helping older people who walk without intent. For a safe, simulated community environment:

- ensure exits are secure
- avoid extremes of stimulation (noise, activity, lighting) and monitor the impact of these on a person's behaviour, confusion and agitation
- mark appropriate doors (e.g. toilet, bathroom) with both letters and pictures
- have familiar pictures to provide cues regarding the location of the older person's room.

16.1.2 Environmental factors as part of a multifactorial intervention

Environmental review and modification should be considered as part of a multifactorial approach in a fall prevention program for older people in RACS.

Education of the workforce and a workforce culture focused on safety and risk management are critical to the effectiveness of multifactorial fall prevention interventions, which include environmental modifications (Appendix 3). By educating the RACS workforce on the risks posed by hazards and other environmental factors, the general awareness of what a hazard or risk to an older person is increases and workers are encouraged to make proactive environmental modifications such as keeping floors dry or removing furniture that poses a fall risk to an older person.[22, 333, 334]

[Point of interest] Using low beds to reduce the risk of injury from falls

The use of high/low beds (beds able to be lowered close to floor level), low/low beds (beds able to be lowered to floor level), bean bag chairs and the occasional practice of people sleeping on mattresses on the floor are alternative options that could be considered to reduce the injury risk of older people who fall out of bed frequently. The use of bed rails should be minimised.

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 Orienting older people new to RACS

Many falls occur in an older person's first few days in a new setting.[335]

The RACS workforce should orient older people arriving at the RACS to their new environment so the older person can safely navigate the RACS, mobilise and transfer safely between furniture or equipment and be confident to use the equipment such as adjustable beds or chairs, walking aids and call bells.[336]

16.2.2 Assessing the older person in their environment

An environmental assessment of the older person's living space should be performed by a health professional, such as an occupational therapist with experience and training in evaluating people and their environment. An occupational therapist can assess the older person's capacity to plan and perform activities of daily living and to meet the functional demands of their environment.[337] This may include:

- Conducting an initial assessment of the environment/s where the older person lives, charting their daily schedule or routine and identifying their activities of daily living.
- Assessing the older person's level of impairment by checking their:
  - ☐ physical capacities such as strength, range of motion, coordination, sensation, balance
  - ☐ perceptual or cognitive function
  - ☐ general mobility, including transfers from bed and wheelchair ambulation, where used.
- Conducting a performance evaluation using an Activities of Daily Living (ADL) checklist or standardised ADL evaluation. Assessments that focus on functional performance and safety in ADL concurrently are recommended. ADL assessments of an older person should include:[334, 337]
  - ☐ **mobility:** ability to move in bed, wheelchair mobility and transfers; indoor and outdoor ambulation with equipment and use of transportation, where appropriate
  - ☐ **self-care activities:** capacity for dressing, feeding, toileting, bathing and grooming

- ☐ **management of environmental devices:** use of light switches and call bells; ability to open windows, reach into cupboards and access personal items
- ☐ **communication:** the ability to summon help and communicate needs.

The assessment should include observing the older person within their environment, including their use of equipment, at the same time of day and in the same location where the older person normally does these tasks and with the same walking aids and devices that they would usually use.

When evaluating the older person's performance in ADL, the occupational therapist should observe:

- methods the older person is using or attempting to use to accomplish the task
- safety factors available to and used by the older person, such as the use of equipment safety features
- ease of mobility of the older person
- limitations on the older person imposed by the environment, such as disparity in transfer surfaces, inappropriate position of grab rails
- suitability of existing assistive devices available for use by the older person.

At the end of the evaluation of the older person, the occupational therapist should provide recommendations for:

- additional safety equipment
- assistive devices and recommendations for the older person's use
- rearrangement of furniture
- environmental modifications
- training requirements of the older person in safe transfer technique and equipment use
- referral to a community exercise class which has a strong focus on balance or functional exercise
- a medicines review with a pharmacist or general practitioner.

Equipment or alterations should be noted in terms of size, specification and cost.

Recommendations should be reviewed with the relevant RACS workers and the older person and their carers and family (to the extent that the older person chooses). A visit from any health professional is an opportunity to check all fall risks and consider additional interventions.

16.2.3 Designing multifactorial interventions that include environmental modifications

Effective multifactorial fall prevention interventions for older people in RACS should incorporate environmental modifications such as:

- ensuring chairs and beds are at the correct height (i.e., when the older person's 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
- installing way-finding night lighting to the toilet
- making sure night lighting is used consistently and safely
- installing nonslip flooring in wet areas
- routinely cleaning up wet floors
- installing additional handrails in bathrooms and corridors
- reducing items that may be present in the older person's room that prevent the older person from moving freely around their room, with the older person's agreement
- providing and repairing walking aids
- replacing or repairing unsafe footwear
- removing loose carpets
- providing individual seating
- promoting wheelchair safety
- providing bed stabilisers and bedside commodes at night
- moving older people at higher risk of falling closer to the nursing station
- using electronic warning devices
- eliminating the inappropriate use of restrictive practices.

Compliant flooring for preventing fall-related injuries

Low-impact flooring can reduce fall-related injuries and prevent fractures in RACS and should be considered in line with the Guidelines on National Aged Care Design Principles.

16.2.4 Conducting environmental reviews of RACS

Regular environmental reviews of the entire RACS premises, internal and external, should be undertaken with the audit of high-risk environments such as bedrooms, dining rooms, bathrooms and toilets prioritised. The results of the environmental review should be used to inform:

- modifications to the environment
- any policy or procedure changes
- the workforce on risks and hazards to be managed
- environmental hazard assessments of older people within the RACS.

Other types of high-risk environments should be identified through incident monitoring, hazard identification, near-miss reporting and environmental checks. Ensure a mechanism is in place for reporting and addressing environmental hazards.

Consideration could be given to how environmental reviews may fit in with existing workplace health and safety audits. It is important to involve a range of disciplines in environmental reviews and interventions in RACS, including:

- health professionals
- workplace health and safety personnel
- infection-control personnel
- staff working in that particular environment
- specialists in geriatric assessment or ergonomics
- technical advisers
- older people's carers or family, where appropriate.

When considering environmental change at the RACS, explore a range of products, equipment and innovative solutions. Consider the potential negative impact that changes to the older person's environment, such as reorganising furniture, may have on the older person, particularly older people who are visually impaired or have dementia.

RACS workers should engage the older person in discussions about their goals and preferences and ensure that their privacy and agency are respected.

16.2.5 Incorporating safety into capital works planning and design

The Australian Guidelines on National Aged Care Design Principles have been developed to guide residential aged care providers and architects when building or renovating aged care facilities. The Guidelines stress the importance of:

- safety and practicality over aesthetics
- conformance to relevant national, state and territory-legislated safety requirements
- a design that allows the observation and/or surveillance of older persons as an important safety element
- lighting and handrails at steps and stairs and stairs that are designed to enable safe descent
- slip-resistant flooring is installed in all wet areas.

16.2.6 Providing equipment and storage

The risk of falls needs to be considered when new equipment is acquired and when existing equipment arrangements are being designed or modified; for example, walking aids, new bedding, new seating or shower chairs. Involve health professionals and the RACS workforce in decisions about buying equipment.

Consider how to communicate and manage changes in equipment used regularly by older people to minimise any potential negative impacts on the older people in the RACS, particularly older people who are visually or cognitively impaired.

Reduce clutter and improve safety by providing adequate storage space for equipment and ensure equipment is audited at least monthly.[4]

16.2.7 Review and monitoring

Environmental strategies are likely to be done in conjunction with other interventions to reduce falls. The effectiveness of environmental interventions is likely to be reflected in falls indicators, such as a change in the location of falls and a reduction in falls associated with particular environmental hazards.

RACS workers should review and assess environments in RACS regularly, particularly high-risk environments such as bedrooms, bathrooms and dining rooms.

Mapping falls

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

Case study

Mr C has Parkinson's disease. Recently, RACS workers noticed that Mr C finds it hard to rise from the lounge chair in his room. RACS workers advised his general practitioner, who undertook a medical review, and an occupational therapist assessed his transfers and activities of daily living.

Mr C's chair height was adjusted, and a wedge cushion was supplied (for use in both lounge and dining rooms). An electric bed was provided for bed transfers, and support workers were instructed on how to safely help him with transfers, given his condition.

Mr C now attends regular group exercise sessions with the physiotherapist aimed at balance and strength training. As a result of this process, Mr C 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. The unique characteristics of older people who are cognitively impaired may adversely affect their interaction with the environment.

As well as reviewing the environmental factors, RACS workers should make sure that changed behaviours such as wandering and agitation are addressed.[338, 339]

Specific environmental changes can help older people with cognitive impairment to be more comfortable and independent and can reduce 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.

Dementia

Colour-coded rooms and the use of familiar photos in specialist dementia units have been used in some Australian RACS to help cognitively impaired older people know which room is theirs. Other things that may help include:

- using calming colour schemes to reduce agitation
- making sure the environment supports and promotes improved continence; for example, the toilet is close by, is easy to find and is clearly marked
- providing a predictable, consistent environment and routine
- using suitable and stable furniture without sharp edges
- providing adequate lighting with enough coverage to ensure clear vision and to prevent casting shadows.

Specific recommendations for dementia care and the built environment suggest that home-like surroundings may be associated with less agitation and disruptive behaviour for people with dementia. This may prevent falls.

16 Environment

For older people with mild dementia, an environment hazard reduction assessment combined with a balance and strength prevention exercise was feasible and acceptable in preventing falls.[340]

Additional information

- For new residential aged care service builds and renovations of existing facilities, follow the Australian Guidelines on National Aged Care Design Principles.
- Australian Standard: AS3811 Hard wired consumer communication and alarm systems for use in health care facilities.
- The Dementia Enabling Environments Ten Key Principles developed by Richard Fleming and supported by Dementia Australia. An environmental assessment tool (EAT) supports the principles with specific indicators. It is promoted for use in hospitals, community health settings and residential aged care services.
- The Key Principles for Improving Healthcare Environments for People with Dementia, developed by the NSW Agency for Clinical Innovation, provides an overview of the principle, how to apply the principle in practice, the evidence behind the principle, expected outcomes and quality measures.

17 Monitoring and observation

17.1 Background and evidence

In Australia, about 20% of falls leading to hospitalisation occur in residential aged care services (RACS), with many falls in RACS unwitnessed.[11, 341]

Monitoring and observation provide an opportunity to support and supervise the mobility and transfers of older people in RACS. The monitoring and observation of older people who are at higher risk of falling in getting out of a bed or rising from a chair unsupervised, particularly for older people with cognitive impairment, has been shown to be effective in a range of care settings.

Monitoring and observation interventions which have been investigated in the hospital setting but may be useful in the RACS setting, include:

- locating the older person in an area of higher visibility, such as near the nursing station or in the scope of video surveillance[342]
- flagging those older people at high risk through the use of fall risk alert cards or symbols[226, 343]
- ensuring the RACS workforce is aware of the fall-risk status of each older person and what level of supervision each older person requires
- making frequent, systematic observations of high-risk older person[344]
- using sitter programs[342]h[345]d[346]
- using alarm systems and alert devices.[347]

There is not enough evidence to date to demonstrate the effectiveness of recent technology for detecting falls through movement or fall detectors.[91]

Ethical considerations

The use of individual and large-scale observation, monitoring and surveillance systems has ethical and legal considerations. Planning and use of monitoring and surveillance systems should be discussed with older people and their carers and family (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. RACS 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.

17.2.1 Monitoring and observation in RACS

Individual monitoring and observation interventions should be prioritised for older people at the highest risk of falling. For example, those who experience immobility may be at a lower risk of falling than other older people in RACS.

Considerations for individual 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. Ensure that workers are aware of the fall-risk status of each older person and the level of monitoring that they require. Review worker practices, such as the timing of tea and lunch breaks, to ensure adequate supervision is available when required.

Where possible, it is recommended that high-visibility beds or rooms (such as near nursing stations) should be allocated to older people who require more attention and supervision, including older people who have a higher risk of falling.

17.2.2 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 could be considered in discussion with the older person to ensure ongoing communication of high-risk status and education on reducing fall risk.

The older person's risk of falling should be flagged in a way that is respectful of their privacy and is easily recognised by workers, 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[343]
- signs, pictures or graphics on or near the bedhead.[226, 343, 348]

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

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.[226]

17.2.3 Colours for stickers and bedside notices

It is recommended that RACS introduce a flagging system that is consistent across the RACS. Flagging using colours or symbols is shown to be the most effective (see Appendix 3). Green or orange are frequently used colours for stickers and bedside notices to signify a high risk of falling. Ongoing worker education about the purpose and importance of flagging is essential to ensure the flagging system's effectiveness.

Ideally, in the hospital setting, patients who have a higher risk of falling should be checked at least half-hourly and offered assistance. This may also apply to the RACS setting, and workers should remain with the high-risk older person while the older person uses the bathroom.[344]

If appropriate, RACS workers should notify the older person's carers, family or friends of the older person's risk of falling and their need for close monitoring. Encourage them to spend time sitting with the person, particularly during waking hours, and to notify workers if the older person requires assistance.

17.2.4 Volunteer programs

In hospital settings, sitter programs use volunteers, family members or paid workers to sit with older people who have a higher risk of falling. There is some evidence that providing sitters reduces inpatient falls in the time that sitters are present in a hospital ward – generally in shifts across business hours on weekdays.[349] There is also moderate evidence that video monitoring was at least as effective as sitters in preventing falls and reduced the need for sitters in hospitals. (Appendix 3)

There is no evidence about the effectiveness of sitter programs in RACS.

17.2.5 Response systems

There is no evidence to support the use of alarms or response systems that sound when a person moves or presses a button in preventing falls in older people in RACS.

Response systems require capital investment and rely on RACS workers to respond when the alarm sounds. The use of response systems should not replace regular, individualised plans for the monitoring and observation of older people outlined in this chapter.

17.2.6 Automatic fall detection devices

There is little evidence to support the use of automatic fall detection devices in preventing falls in older people in RACS.[350-352] Automatic fall detection devices include:

- **Wearable devices** include 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** include cameras, acoustic sensors and pressure sensors placed in the 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 are dependent on a connection to the internet or mobile phone service to communicate that there has been a fall
- RACS workforce may need to assist the older person in charging and wearing the device
- wearable devices may interfere with the older person's safe mobility and daily functioning
- devices may provide false alarms
- people may have privacy concerns in using the device
- devices may be limited to a specific space.

17.2.7 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 that are used. Indicators of the acceptance of individual monitoring and observation systems may include:[345, 346]

- frequency of use of monitoring and observation methods
- satisfaction of workers, 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

Ms J is 90 years old and lives in a RACS. She is mobile, has dementia and has been falling frequently in the past month. All RACS workers and health professionals (including medical, allied health, nursing, administration, food services and operational staff) are aware of Ms J's high fall risk.

There is an ongoing reminder that Ms J should always walk with supervision. To avoid confusing and disorientating Ms J, workers agree with Ms J's substitute decision-maker that she would not move to a room of higher visibility; rather, she would be checked on hourly during the night and day. If Ms J is awake, she is offered assistance. Family, carers and friends know of Ms J's high risk of falling and are encouraged to spend time with her. Recognising the importance of maintaining her mobility, workers do not discourage her from being mobile and provide supervision. An alarm device is used when she is in bed. All workers respond promptly when the alarm is activated.

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.[353]

17 Monitoring and observation

An individualised behaviour support plan (see Chapter 8 Cognitive Impairment) that considers a range of interventions is developed to support the older person to reduce their risk of falls while maximising their mobility.

Additional information

A range of alarm systems and alert devices are on the market for purchase, including motion sensors, video surveillance and pressure sensors. They should be tested for suitability before purchase, the upfront and ongoing costs considered, and their implementation supported by appropriate training of the RACS workforce, education of the older person and a tested RACS alarm response mechanism.

18 Restrictive practices

18.1 Background and evidence

Restrictive practices refer to any practice, intervention or mechanism that restricts the rights or freedom of an individual and is used to control or modify that individual's behaviour, including reducing a person's risk of falls. Restrictive practices include chemical restraint, environmental restraint, mechanical restraint, physical restraint and seclusion. If used, restraints should be the last option considered.

In Australia, the use of restrictive practices is strictly regulated and monitored to protect the health, rights and dignity of older people receiving aged care services. The Commonwealth aged care legislation contains protections and safeguards that must be satisfied by aged care providers who are registered to provide home and community care before the provider can use a restrictive practice.

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

18.1.1 Types of restrictive practices

There are five types of restrictive practices:[354]

Chemical restraint

Chemical restraint is a practice or intervention involving medicines for the primary purpose of influencing the behaviour of a person. 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.

Environmental restraint

Environmental restraint involves a RACS or its workforce restricting free access to all parts of a person's environment to influence behaviour. This includes items and activities.

Mechanical restraint

Mechanical restraint is when a device is used to prevent, restrict or subdue movement to the influence behaviour of a person.

Mechanical restraint includes bed rails, lap belts, tabletops, meal trays and backwards-leaning chairs ('palliative care chairs' or 'princess chairs') that are difficult to get out of. Bed alarm devices can also be considered a mechanical restraint.

Covert mechanical restraint practices include tucking bed clothes in too tight, wedging cupboards against beds or locking doors.

A systematic review of mechanical restraint use and injuries found an association between restraint use and increased risk of injury and death.[355]

Physical restraint

Physical restraint is using force to prevent, restrict or subdue movements of a person's body.

The prevention of falls is cited as the most common reason for the use of physical restraints in RACS.[4] Studies have shown that some RACS workers believe that restraining people will prevent a fall; however, evidence suggests that people who are restrained are more likely to fall.[354, 355]

Seclusion

Seclusion is 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 Restrictive practices

18.1.2 Mandatory reporting

RACS providers are required to report data on physical restraint to the Australian Government Department of Health and Aged Care through the National Aged Care Mandatory Quality Indicator Program. This includes all restrictive practices, excluding chemical restraint.

This data provides an evidence base that can be used to improve the quality of services provided to older people.

18.1.3 Behaviour support plans

In Australia, 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. [5] 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. Behaviour support plans must be reviewed and updated as behaviour changes are observed or occur and to reflect any new information that is received about the older person.

18.2 Principles of care

In Australia, the use of restrictive practices is strictly regulated and monitored to protect the health, rights and dignity of older people receiving aged care services. A strong legislative framework exists for the use of restrictive practices in aged care. The *Quality of Care Principles 2014* (Part 4A) contain protections and safeguards that must be satisfied by approved providers of RACS before using restrictive practices.

An older person's behaviour support plan should proactively prevent behaviour changes from occurring and support an older person should they experience changed behaviour.

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

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.

18.2.1 Policies and procedures on use of restrictive practices

Policies and procedures to eliminate the *inappropriate* use of restrictive practices in RACS must be in place and in line with national, state and territory legislation and guidelines.

A RACS must have policies and processes in place to ensure the protection of the physical and mental health of all people residing in RACS. 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
- the use of behaviour support plans.

It is vital that all policies and procedures are understood by the RACS health professionals and workers.

18.2.2 Assessing the need for restrictive practices and considering alternatives

Causes of agitation, wandering or other behaviours should be investigated, and 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.

Alternatives to the use of restrictive practices

Wandering behaviour by 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:[356]

- 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 RACS' routine, as much as possible
- decreasing environmental noise and activity
- exploring the older person's previous routines, likes and dislikes, and attempting to incorporate these into the care plan.

Workers and health professionals should be provided with education about 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.[357-361]

18.2.3 Using restrictive practices

When the older person's multidisciplinary team has considered all alternatives to restrictive practices and agreed that the alternatives are inappropriate or ineffective, restrictive practices could be considered, in line with the Quality of Care Principles 2014 (Part 4A).

The *Quality of Care Principles* (Part 4A) include requirements that:

- the restrictive practice is used only as a last resort to prevent harm to the person or others, and after consideration of the likely impact on the person
- to the extent possible, best practice alternative strategies have been trialled and documented in the person's behaviour support plan before the restrictive practice is used
- the restrictive practice is only used to the extent necessary and in proportion to the risk of harm to the person or others
- the use of the restrictive practice complies with provisions outlined in the person's behaviour support plan
- the restrictive practice is used with the informed consent of the person, or if they lack the capacity to provide that consent, their substitute decision maker for restrictive practices.

Chemical restraints

Additional obligations for the use of chemical restraints exist under the *Quality of Care Principles*. RACS must be satisfied that an approved health practitioner with day-to-day knowledge of the care recipient has:

- assessed the person as posing a risk of harm to themselves or any other person
- assessed that the use of the chemical restraint is necessary
- prescribed medicines for the purpose of using the chemical restraint, and
- obtained informed consent to the prescribing of the medicines for the purpose of using the chemical restraint.

Caution is required to ensure that psychotropic medicines are not overused and prescribed as an alternative method of chemical restraint.

Rights and wishes of the older person

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

18.2.4 Review and monitoring

Every RACS should have policies and procedures on restrictive practices that are reviewed regularly. Workers should demonstrate their understanding of this policy and their knowledge and skill in identifying, managing and escalating changed behaviours and implementing alternative strategies to restrictive practices.[362, 363]

Trends in the use of restrictive practices should also be identified, monitored and documented, such as the rationale for using a restrictive practice, the duration of use and the alternative strategies that were considered and have been used.[356]

Case study

Ms S is a 90-year-old woman who lives in a RACS. She has dementia and walks with supervision. Her family requested that the workers raise the bed rails when she is in bed because they were concerned she would get up without assistance and could fall. Workers discussed with Ms S's family the potential for injury if she manages to climb over raised bed rails. They informed the family of their preventing restrictive practice policy, which particularly targets the reduced use of bed rails or bedsides.

Ms S' fall risk was reassessed, and her management plan was reviewed to address the identified risk factors for falling. This included a medicines review and reduction in psychotropic medicines and a supervised balance and strengthening exercise program with the physiotherapist. Ms S also began wearing hip protectors. Her bed was lowered to its lowest height when Ms S was in bed, and one side was placed against the wall. Workers ensured that everything she needed was within her reach. Despite their efforts, the family remained insistent that the bed rails be raised. A multidisciplinary case conference with the family, general practitioner and the registered nurse was arranged. Information about the risks of bed rails was provided and the family agreed that these would not be used.

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 alternate best practice behaviour management strategies have been trialled and documented.

18 Restrictive practices

Additional information

- The Australian Government funds several programs and initiatives to support providers in caring for people living with dementia and experiencing changes in their behaviour. This includes Further information is available at the Department of Health and Aged Care and includes clinical support, dementia training and support programs, and a 24-hour helpline.
- *Aged Care Act 1997: Quality of Care Principles 2014*
- Psychotropic Medicines in Cognitive Disability or Impairment Clinical Care Standard.
- Australian Government Department of Health and Aged Care Restrictive Practice is Aged Care: A Last Resort.
- Australian Government Aged Care Quality and Safety Commission – Restrictive Practices provider resources.
- Australian Government Aged Care Quality and Safety Commission Decision-Making Tool – Supporting a restraint-free environment in residential aged care.
- Australian Medical Association (2022) Position Statement: Use of restrictive practices in residential aged care facilities.
- Victoria Health Government Clinical Decision Tool on Physical Restraints:
- Clinical Practice Guidelines for the Management of Delirium in Older People
- Delirium Clinical Care Standard
- Further information about behaviour support plans is available from the Aged Care Quality and Safety Commission.

19 Hip protectors

Recommendation

Hip protectors: Consider the use of hip protectors for older people to reduce the risk of fall-related hip fractures. (Level 2A)

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. [1] Hip fractures are one of the more severe injuries associated with falls, and usually require surgery and lengthy rehabilitation. 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 fracture by absorbing or dispersing forces away from the hip if a fall onto the hip area occurs. 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 residential aged care services (RACS).[364, 365] Wearing a hip protector may be a visual reminder of the consequences of falling and cause the older person and RACS workers to modify their behaviour to minimise the risk of the older person falling.[366]

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

- commitment of RACS workers supporting the use of hip protectors by older people, and
- education of the RACS workers and older persons as to how to wear hip protectors and the benefits of hip protectors.

Hip protectors can, therefore, be used as part of a multifactorial fall and injury prevention intervention in RACS, although they will not prevent falls or protect other parts of the body.[367]

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 so that the soft tissues and muscles of the surrounding thigh absorb the energy.[368] 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,[369] 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.[370]

The force generated by a fall from a standing height is approximately 6000 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 2000 newtons in a laboratory test.[371, 372] 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.).[373] Equally, it has not been demonstrated to be harmful to wear a hip protector in these circumstances.

19.1.2 Risks associated with hip protectors

There are several risks associated with the use of hip protectors by older people, with about 5% of wearers experiencing adverse effects.[374]

- 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.[364] For example, older people can become less independent in everyday activities because of the extra time and effort needed to put on and take off the hip protectors. This can also cause incontinence in some people.
- If dexterity is an issue for the older person, wearing hip protectors can increase their fall risk because the older person must manage the hip protector during dressing and undressing.

19.1.3 Adherence to the use of hip protectors

Acceptance and adherence to the use of hip protectors by the RACS workforce and the older person is crucial to the effectiveness of hip protectors in reducing harm from falls.[364, 366]

Areas influencing the adherence of older people to the use of hip protectors in RACS include:

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

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

A service commitment 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.[3750]

Role of the RACS workforce in influencing adherence to the use of hip protectors

The attitudes and availability of RACS workers have a substantial effect on whether an older person wears hip protectors.[375, 376]

Structured education about the risk of hip fracture, fall prevention strategies and the use and effectiveness of hip protectors for the RACS workforce and the older person and their carers and family (to the extent the older person chooses) will improve hip protector acceptance and adherence.[377]m[19]

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

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

Acceptance and adherence by older people to the wearing of hip protectors are most affected by the:

- older person's understanding of benefits and risks of wearing hip protectors[376]
- discomfort experienced in wearing hip protectors[375]
- perceived impracticality of hip protectors[378]
- extra effort needed during daily dressing and regular toileting to put on and take off hip protectors[373]
- type of hip protector, whether it is hard or soft[366]
- financial costs to the older person associated with the use of the hip protector
- access to and frequency of laundering of the older person's hip protector if the older person's carers or family are responsible for the older person's laundry
- climate, with adherence to hip protector use being lower in warmer climates, given the increased discomfort in wearing the hip protector close to the skin.

19 Hip protectors

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.[376, 379]

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.

To support older people to make an informed decision about wearing hip protectors, involve the older person in discussions about options for hip protectors and offer choices in the types and sizes of hip protectors.[380] Involve the older person's carers and family to the extent the older person chooses.

Soft, energy-absorbing protectors are often reported as being 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, RACS workers 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.

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

RACS workers can use a fall risk assessment tool (see Chapter 6) and/or a 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

The use of hip protectors for older people in RACS must occur as soon as the need is recognised following the assessment of an older person's risk factors by a physiotherapist or registered nurse. The use of hip protectors must be agreed upon with the older person or their substitute decision maker.

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.[19]

Continence pads can be comfortably worn with soft hip protectors but should be fitted first, next to the older person's skin, before the hip protectors are put on.[381]

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 for men and women are available.

Continence pads can be worn in separate pants, underneath the garments holding the hip protectors.[381]

Adhesive hip protectors (type C)

Adhesive hip protectors are adhesive hip pads that are stuck directly to the skin of the wearer.

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 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 positioned correctly 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

Hip protectors are provided at a cost to the older person in RACS, which may affect acceptability and use. Reimbursement by private health funds or by appliance supply schemes may improve this problem.

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 RACS. RACS workers are in a key position to encourage older people's adherence to hip protector use and the correct application of hip protectors because they assist with personal care such as dressing, bathing and toileting.

Therefore, education and training of the RACS workforce on the reasons and benefits of use and correct application of hip protectors is important in the acceptance and adherence of hip protectors and safe practice of the workforce, and in supporting and encouraging the older person to use hip protectors.

RACS workers should also understand the clinical and behavioural risks associated with wearing hip protectors, the correct storage of hip protectors and the RACS arrangements for the laundering of hip protectors.

Before the older person starts wearing hip protectors, RACS workers should discuss the arrangements for cleaning hip protectors with the older person and their carers and family as appropriate. 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 for their effectiveness.[364]

A standard definition of adherence to the use of hip protectors should be used when reviewing and monitoring their use.[380] 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.

Case study

Recently, Ms H commenced care at a RACS. On commencement of care, her fall risk assessment indicated she had a moderate risk of falling. RACS workers implemented several fall prevention strategies, including recommending safer footwear and referring Ms H to the physiotherapist for an exercise program.

The registered nurse reviewed Ms H's medical report (from her general practitioner) and noted that she had a history of osteoporosis and had fractured a wrist in a fall 12 months earlier. The registered nurse discussed hip protectors with Ms H, highlighting how they appear to work in protecting the hip from injury in the case of a fall. The nurse also showed Ms H examples of the different types of hip protectors and discussed Ms H's preferences.

Ms H discussed buying hip protectors with her family, who bought them for her. Workers monitored and recorded her adherence to hip protector use each day. Ms H reported feeling more confident walking around the RACS when wearing her hip protectors. She finds them comfortable to wear at night, as she usually needs to get up to the toilet once or twice a night.

19.3 Special considerations for cognitive impairment

Older people with cognitive impairment have a higher prevalence of falls and fractures[382] and should be considered for hip protector use. Older people with cognitive impairment will often need help with 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

Recommendations

Dairy food provision: Ensure menus have at least 3.5 servings of dairy foods (milk, yoghurt, cheese) daily to meet protein and calcium requirements for older people. Engage dietitians to assist with menu design that reflects dietary requirements and older people's needs and preferences. (Level 1B)

Vitamin D and supplements: Administer recommended doses of daily or weekly vitamin D supplements to all older people unless contra-indicated. (Level 1A) Avoid monthly doses or yearly mega doses of vitamin D as they can increase the risk of falls in older people. (Level 2A)

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.[383] 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.[384]

Vitamin D may prevent falls by improving muscle strength[385] and psychomotor performance, independent of any other role in maintaining bone mineral density.[386, 387]

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.[388]

[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.[386]

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. In Australia, over 30% of adults have a mild, moderate or severe deficiency of vitamin D.[389]

Residents of residential aged care services (RACS) are at high risk of vitamin D deficiency, with one study showing 86% of women and 68% of men in a RACS in Australia had a vitamin D deficiency. Virtually all the remainder of the study population had vitamin D levels in the lower half of the healthy range.[390]

Other high-risk factors related to vitamin D deficiency are found in older people:

- 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 pigment reduces the amount of vitamin D production after sun exposure
- who are heavily clothed and/or veiled for religious or cultural reasons.[389, 391]

20.1.2 Intervention approaches for improving vitamin D levels

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

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

20 Vitamin D and calcium

Vitamin D supplementation (with or without calcium)

Vitamin D supplementation with or without calcium has been shown to be effective in improving an older person's bone mineral density and reducing their fall risk.[392, 393]L[394] The benefits of supplementation are more certain in older people who are vitamin D deficient.[394] Bone mineral density increases whether the vitamin D is administered orally or injected.[388]

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 calcium of 1300mg per day for men aged over 70 and women aged over 50 to maintain a healthy bone density. Below these ages, the recommendation is 1000mg per day for both men and women.[17]

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 decrease falls.[388] A maximum dose of 500 to 600 mg of elemental calcium per day is recommended if dietary calcium intake is insufficient due to concerns about calcium supplementation increasing the risk of cardiovascular events.[395, 396]

Vitamin D, sunlight and winter

The body's main source of vitamin D is from skin exposure to daylight. Sourcing vitamin D from dietary intake alone is insufficient to achieve healthy levels of vitamin D.[389]

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

The risk of vitamin D deficiency is compounded when consideration is given to the difficulties in ensuring optimal nutrient intake for older people in RACS.[397]

The Geelong Osteoporosis Study found that, in winter, serum vitamin D is reduced, bone resorption is increased, and the proportion of falls resulting in fracture is increased.[398] 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.[391]

Nutrition management

The nutritional status of older people in RACS in Australia is frequently considered poor, and as many as 68% of people residing in RACS may be malnourished or at risk of malnutrition.[399] 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 required to gain the optimal benefits of an exercise program, which can improve balance and mobility, which can lead to a reduced risk of falling. Additional dairy foods incorporated into a RACS menu can improve calcium and protein intake, which can contribute to a reduced risk of falls and fractures in older people in RACS.[400]

Nutrition is not included as a separate core fall prevention activity in the Falls 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 RACS include:

- Vitamin D supplementation can cause toxicity. [20] Prolonged sun exposure does not cause toxicity.
- Hypercalcaemia 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 from taking calcium and vitamin D supplementation. [21] There is no increased risk of death.
- Toxicity with cholecalciferol (vitamin D3) up to 10,000 IU daily occurs predominantly if dietary or oral calcium supplements are high or if granulomatous disorders are present. This is rare.

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 IU daily.[394] According to Healthy Bones Australia, to prevent vitamin D deficiency in people who receive less than optimal sun exposure, vitamin D supplementation is recommended:

- At least 600 IU per day for people under 70 years of age
- At least 800 IU per day for people over 70 years of age
- Sun avoiders or those at high risk of deficiency, including older people in RACS, may require 1,000-2,000 IU per day.

Higher doses are required for 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) may result in an increased risk of falls.[18, 401]

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

Dietitians, nutrition and dietetic support workers, or nursing and medical staff can collect information on the older person's eating habits, meal patterns and sunlight exposure to assess the adequacy of their vitamin D and calcium levels. To do this, they can use:

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

RACS should ensure menus for older people have at least 3.5 servings of dairy foods (milk, yoghurt, cheese) to meet protein and calcium requirements. RACS can engage dietitians to assist with the menu design to ensure the menu reflects the dietary requirements and the needs and preferences of older people.[402]

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

RACS workers should ensure older people in RACS receive minimum sun exposure to prevent vitamin D deficiency, in line with the older person's individual care plan.

20 Vitamin D and calcium

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 sunlight exposure of the face and upper limbs four to six times per week.[403] Note: Exposure to sunlight must be 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 IU/day is recommended.[383]

Consider vitamin D and calcium supplementation

Health professionals should consider the high possibility of vitamin D deficiency in older people living in RACS. It is appropriate to supplement vitamin D for most older people in RACS in Australia with 1,000 IU vitamin D without measuring 25(OH)D vitamin D blood levels. This is based on the prevalence of deficiency, the low risk and the benefit shown when doing it in this untargeted way for hip fracture prevention.[383, 404, 405] If there is uncertainty, 25(OH)D can be measured using a blood test.

The Falls Guidelines recommends that RACS administer recommended doses of daily or weekly vitamin D supplements to all older people unless contra-indicated. RACS should avoid monthly doses or once yearly mega doses of vitamin D as they can increase the risk of falls in older people.

For confirmed cases of vitamin D deficiency, Healthy Bones Australia recommends vitamin D supplementation with 3,000-4,000 IU per day for 6 to 12 weeks, followed by a maintenance dose of 1,000-2,000 IU per day.[403]

Use caution for women older than 70 years

Use caution with calcium supplementation in women older than 70 years of age due to the possible association with cardiovascular events.[395, 396] 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 healthy diet that allows for calcium intake and absorption

While being respectful of the older person's choice and dignity of risk, the RACS workforce should encourage older people to include foods high in calcium in their diet.

The Australian Dietary Guidelines outline calcium and vitamin dietary suggestions and hints and can be shared with older people in RACS to educate the older people on healthy diet habits and to encourage them to include more calcium in their diet.

Improving calcium and protein intake by consuming extra dairy foods such as milk, yoghurt and cheese has been shown to reduce the risk of falls and harm from falls in older people.

Referral to a dietitian may be appropriate if an older person:

- is having trouble consuming adequate calcium
- has lactose intolerance
- does not include calcium as a normal part of their diet, such as for cultural reasons
- does not consume dairy foods, for example, if the older person follows a vegan diet.

Discourage older people from consuming foods that prevent calcium absorption

Oral calcium intake needs to meet the recommended daily intake (RDI). To achieve this, discourage older people from consuming foods, such as caffeine and soft drinks containing phosphoric acid, that prevent calcium absorption. Instead, encourage the older person to include foods high in calcium in their diet while being respectful of the older person's choice and dignity of risk.

Analysis of food intake records or diet history should show a daily intake of calcium of 800 mg for men and 1000 mg for women.

Case study

Ms Q lives in a RACS and has been falling frequently. RACS workers report that Ms Q has difficulty getting out of a chair and has notable proximal muscle weakness - a clinical manifestation of vitamin D deficiency. Ms Q eats a nutritionally balanced diet, including regular consumption of milk. She does not go outside but does enjoy sitting by the large glass windows in the sunroom. Unfortunately, glass absorbs nearly all ultraviolet B photons, which are required for vitamin D production.

Blood tests confirmed vitamin D deficiency, which was corrected with vitamin D supplementation with 3,000-4,000 IU per day for 6-12 weeks, followed by a maintenance dose of 1,000 to 2,000 IU per day. Other interventions were also discussed with Ms Q and included as part of a targeted multifactorial fall prevention program in response to her individual fall risk assessment.

20.3 Special considerations for cognitive impairment

Cognitive impairment in older people in RACS may result in reduced oral intake of calcium and reduced exposure to sunlight if outdoor mobility is limited.

Medicines 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.

Additional information

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

- Australian Dietary Guidelines (2013) published by the National Health and Medical Research Council
- Clinical guidelines and statements are provided by 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.

21 Osteoporosis

Recommendation

Osteoporosis medicines: Administer prescribed osteoporosis medicines (unless contra-indicated) for older people with diagnosed osteoporosis or a history of minimal trauma fractures. (Level 1A)

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.[406]

Osteoporosis is a common disease in Australia, with 66% of people aged over 50 years living with osteoporosis or osteopenia (low bone density).[407]

There is evidence of undertreatment of osteoporosis in older people in residential aged care services (RACS), with older people in RACS having an increased fracture risk due to osteoporosis or osteopenia.[408, 409] For people with osteoporosis or osteopenia, fracture risk increases with each additional fall.[407]

21.1.1 Falls and fractures

Only a small proportion of falls result in fractures, but most fractures occur after falls.[410]

A previous minimal trauma fracture is one of the strongest risk factors for a future fracture.[411]

Bone mineral density (BMD), quadriceps strength and postural sway are three key factors that contribute to a person's fracture risk.[412] BMD is an important measure in predicting fractures in both men and women.[412] No therapy is likely to normalise BMD, but small improvements can reduce fracture risk.[413]

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.[406]

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).

Health professionals and care workers in RACS 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 can be detected opportunistically by routine screening in RACS, such as older people on long-term steroids.

Fracture risk assessment

A fracture risk assessment can be used to assist in determining whether an older person has a high risk of fractures and should, therefore, be considered for osteoporosis treatments.

Two web-based fracture risk calculators are:

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

The web-based Fracture Risk Scale, Break Free, developed for general practitioners working in RACS in Canada, has been adopted for use in RACS in Australia.[414]

Bone mineral density test

Osteoporosis can be diagnosed by having a BMD test, which measures the amount of minerals in a specific area of bone, usually 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:[407]

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 (osteopaenia), 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) means 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,[415, 416] with evidence that they affect a reduction in spine, hip and non-vertebral fractures.[417] 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.[407]

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. The prescription of these agents must be initiated by a non-general practitioner specialist or consultant physician.

Vitamin D and calcium supplementation

As most of the trials of antiresorptive agents have used concomitant calcium and vitamin D (see Chapter 20), it is appropriate to ensure 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.[417] Vitamin D should be considered for the prevention of osteomalacia in at-risk individuals.[418]

Risks associated with osteoporosis medicines

The responsible prescriber must consider the known risks associated with bisphosphonates, denosumab and other osteoporosis medicines and the manufacturer's advice and ensure these risks are communicated to the older person and their carers and family (to the extent the older person chooses). Risks should be documented in the older person's patient file at the RACS to ensure the RACS workforce is aware of the risks to the older person in being prescribed this medicine.

21 Osteoporosis

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.

In older people in RACS, osteoporosis treatments must take account of the likelihood of comorbidity and the use of multiple other medicines.

RACS should establish protocols to increase the rate of osteoporosis treatment in older people who have sustained their first osteoporotic fracture.[411]

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.[406] It is also likely that any minimal trauma fracture sustained by an older person is an indication of osteoporosis.[419] 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.[420]

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, including the older person's general practitioner (GP), should be on alert for anyone who has signs of osteoporosis, including thoracic kyphosis, loss of height or previous minimal trauma fracture.

GPs 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.[421]

Pharmacological interventions are the main interventions for treating osteoporosis and reducing fracture risk.

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.

21 Osteoporosis

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.[415]
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.[415, 416]
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. [415, 416]
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, decreasing bone resorption and increasing bone density, available as a 6-monthly subcutaneous injection.
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.[422]

21 Osteoporosis

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 and, thus, 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 spine and hip bone mineral density.[423-425] Prescription can only be initiated by a specialist or consultant physician.

21.2.3 Review and monitoring

A good-practice clinical indicator in RACS 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 N is an 85-year-old lady who lives in a RACS. She has a history of falling and recently fell and fractured her hip. She thinks she has a family history of osteoporosis and commenced treatment for osteoporosis while in hospital. On return to her RACS, Ms N was treated by a physiotherapist using a graduated exercise program, beginning at a low intensity, with a goal of safe ambulation with the use of a frame. Ms N was prescribed bisphosphonate medicines as well as vitamin D and calcium supplementation. She was also taught about the use and availability of hip protectors.

21.3 Special considerations for cognitive impairment

Older people with cognitive impairment should be supervised in correctly and safely 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

Further recommended guidance on osteoporosis management, particularly related to medicines management, is provided in the following resources:

- 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 contain recommendations on the appropriate treatment and care of people with specific diseases and conditions.
- Healthy Bones Australia (formerly Osteoporosis Australia) is a national organisation that aims to reduce fractures and improve bone health in the community.

22 Post-fall management

22.1 Background

All falls in residential aged care services (RACS) 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 condition in an older person. Also, older people who fall are more likely to fall again.[410]

The RACS workforce should be aware of:

- what constitutes a fall
- what to do when a person falls, and
- 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 RACS.

Every fall should be identified, reviewed and reported, including an immediate clinical response, observations, new fall risk assessment and escalation when required.

The circumstances surrounding a fall are of critical importance. Information regarding the fall may need to be sourced from the older person, workers, visitors and witnesses. This may be particularly important if the older person does not recall the circumstances of the fall.

22.2.1 Internal policy for preventing and responding to falls

RACS must implement policies and processes for preventing and responding to falls, which are understood by the RACS workforce and health professionals. Training and education in post-fall management, reporting and documentation should be provided.

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 RACS policy.

22 Post-fall management

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). The RACS's fall policy should guide the RACS worker according to their level of training, including helping them to know when to call for assistance.
Check for injuries
Check for signs of injury, including abrasion, contusion, laceration, fracture and head injury.
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. Workers should use a lifting device instead of trying to lift the older person on their own. Follow the RACS'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 older person's GP and provide relevant details.
Ensure ongoing monitoring of the older person because some injuries may not be apparent at the time of the fall. Make sure RACS workers know the type, frequency and duration of the observations that are required.

22 Post-fall management

Report the fall
Report all falls to the older person's GP, even if injuries are not apparent. The medical practitioner should assess and treat any injury, assess the conditions that may have caused the fall, and put any appropriate interventions in place. Workers may need to call for an ambulance to transfer the older person to hospital. In this case, transfer information should be provided, including details of the fall event.
Document all details in the older person's medical record, including appearance or response, evidence of injury, location of the fall, which the older person's GP 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 mechanisms of the fall (e.g. slip, trip, overbalance, dizziness), and whether they lost consciousness or had a conscious collapse.
Ensure data on all falls and falls with major injury is reported to the Department of Health and Aged Care through the National Aged Care Mandatory Quality Indicator Program.
Discuss the fall and future risk management
Communicate to all relevant RACS workers and the older person's family, carers and the substitute decision-maker that the older person has fallen and has 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 every fall

All older people who fall require a comprehensive assessment, in addition to a new fall risk assessment, to be completed by a suitably qualified health professional. If necessary, consider referring the older person to a specialist medical practitioner, such as a geriatrician, who can undertake the comprehensive post-fall assessment.[426]

Post-fall assessments are part of successful multifactorial interventions for reducing falls in RACS.291 A comprehensive fall assessment includes: [426]

- 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 the immediate follow-up of a fall by an older person, the cause of the fall and the injuries related to the fall 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 RACS fall policies and practice guidelines:[22]

- 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 the older person.
- Undertake a fall risk assessment (see Chapter 6) as new fall risk factors for the older person may be present.
- 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. This will often involve referrals to other members of the multidisciplinary team, such as general practitioners, physiotherapists, exercise physiologists, podiatrists and dietitians.
- 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.[427]
- Consider the use of fall injury-prevention interventions for the older person. For example, discuss with the general practitioner the use of hip protectors and vitamin D and calcium supplementation (see Chapters 19 and 20).
- Consider investigations for osteoporosis in the older person in the presence of minimal trauma fractures (see Chapter 21).
- Ensure the effective communication of fall risk assessment and management recommendations to the RACS workforce, 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

A post-fall analysis is undertaken to inform an evaluation of the older person's multidisciplinary care plan and the fall prevention interventions. Comorbidities and fall risk factors should be identified and addressed, and the older person's individual care plan should be updated to reflect the incidence of a fall and the relevant post-fall actions.

Analysis of falls should be undertaken to inform quality improvement activities, inform education and training of RACS workers in fall prevention and improve organisational practices and policies for preventing falls.[22]

An in-depth analysis, such as a root-cause analysis (RCA) of all falls in RACS, should be completed, particularly when there has been a serious injury or death following a fall. In some jurisdictions, a fall in a RACS that results in death must be reported to the state coroner.

22.4.2 Assessment and training for rising from the floor after a fall

Assessment of ability to rise from the floor

For older people in RACS who are more agile, it may be useful to assess the ability of the older person to rise from the floor after a fall. 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. [6] 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.[10]

The Floor Transfer Test is a valid and reliable measure for assessing a person's ability to rise from the floor.[428, 429] 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.[430, 431] 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 fear of falling,[427], which can occur even in the absence of injury. In the period after a fall, RACS workers should observe the older person to note any change in their usual activity that might indicate the presence of, or increase in, fear of falling. Speak to the older person about any concerns about falling they may have.

Common approaches to improving loss of confidence or fear of falling by older people in RACS include participating in a balance and mobility training exercise program and other fall prevention activities, including the use of hip protectors.[432]

22.5 Reporting and recording falls

Accurate reporting of falls is supported in workplaces where there is a 'no blame culture'. Workers may feel anxious when completing an incident form and can associate the incident with feelings of guilt and blame. For accurate reporting of falls, the leaders in the RACS must promote incident reporting as a part of the quality improvement process rather than a punitive tool to identify potential staff negligence. This requires a fair and just culture for achieving safe and high-quality care.

22 Post-fall management

For high-quality care and effective risk management, information about falls must be collected and collated to monitor falls, identify fall patterns, identify ways of preventing further falls and provide feedback on the effectiveness of fall prevention programs.

As part of ongoing education on fall prevention for RACS workers, providing regular monthly feedback to RACS workers on the local rates of falls and severe injuries and other fall trends data has resulted in significant decreases in the number of falls and people who fell in RACS.[22] Regular feedback improves awareness of fall risk and improves routine care as part of the RACS's continuous quality improvement plan.

22.5.1 Minimum dataset for reporting and recording falls

A minimum dataset about all falls within a RACS should be collected for reporting and reviewing and to improve the safety and quality of care for older people. Items to be included in a minimum dataset should be determined by each RACS.

Table 22.2 is an example of what 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 RACS.

Table 22.2: Minimum data set items for reporting and recording falls in RACS

Minimum data set items
The older person's current and relevant diagnoses or problems
Date, time and place of the fall
Type of fall (e.g., slip, trip, bumping into or falling on an object)
Activity at the time of the fall (e.g., attempting to stand, walking)
Whether the older person depends on mobility aids or RACS workers to mobilise
Relevant information about clothing, footwear, eyewear and mobility aids used at the time of the fall
Any restrictive practices in use for the older person
If the older person has a behaviour support plan in place, and if so, what it involves
Any recent change to the older person's medicines that might be associated with fall risk
Any RACS workers providing supervision to the older person 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 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 a 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, RACS may consider developing a fall-specific incident form to focus on the details required to monitor fall incidences and management plans. Any of this information not being collected can be captured by incorporating it into existing incident reports.

To achieve the most accurate information about the incident, the space in the form asking for a description of the fall should allow for free text. There should be room on the incident form for additional comments to be made.

RACS workers should be encouraged to complete all sections of the incident report to minimise missing information when the fall is being reviewed.

22.5.2 Mandatory reporting

National Aged Care Mandatory Quality Indicator Program

RACS providers are required to report data on falls and falls with major injury to the Australian Government Department of Health and Aged Care through the National Aged Care Mandatory Quality Indicator Program. This data provides an evidence base that can be used to improve the quality of services provided to older people in RACS.

Any data collected should be used to inform changes in RACS practice aimed at fall rates. This requires analysing collected data regularly, monitoring trends, comparing falls data with that from other RACS and making improvements to routine care based on the findings.

Serious Incident Response Scheme

The Aged Care Quality and Safety Commission (the Commission) is the national regulator of Commonwealth-funded aged care services, including RACS, and receives reportable incident notifications through the Serious Incident Response Scheme (SIRS).

The SIRS aims to reduce abuse and neglect of older people receiving Commonwealth-funded aged care services. The SIRS establishes responsibilities for all providers to:

- prevent and manage incidents (focusing on the safety and wellbeing of older people)
- use incident data to drive quality improvement, and
- to report serious incidents.

Providers must use the My Aged Care provider portal to notify the Commission if a reportable incident occurs. Reportable incidents under SIRS include:

- unreasonable use of force
- unlawful sexual contact or inappropriate sexual conduct
- neglect
- psychological or emotional abuse
- unexpected death
- stealing or financial coercion by a staff member
- inappropriate use of restrictive practices, and
- unexplained absence from care (missing consumers).

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

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Appendix 2: Contributors to the 2009 Guidelines

Contributors

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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 Residential Aged Care Services* is provided below, including a discussion on the analysis of evidence in identifying current best practice in preventing falls and harm from falls in older people in residential aged care services.

The information is presented in line with the chapters of the 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 residential aged care 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 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 good 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/ 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 run by the Commission, 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 2018 Cochrane review on interventions for preventing falls in older people in RACS was undertaken by updating the search to December 2021 using the key inclusion criteria, outcome data extraction and analysis methods used by Cameron et al., 2018.[1]

We searched for randomised controlled trials (RCTs) that reported data relating to the rate or number of falls or the number of participants sustaining at least one fall during follow-up (fallers). We included trials in which most participants were aged over 65 years, or the mean age was over 65 years, and the majority were living in RACS. Searches were conducted in the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register, MEDLINE, Embase and CINAHL from August 2017 to December 2021. Studies reported as "awaiting assessment" in Cameron et al. 2018 [1] were assessed. This update did not include conference abstracts, ongoing studies, or trial registry records and only studies reporting data suitable for meta-analysis were included. Study selection, data extraction, risk of bias assessment and GRADE ratings of confidence in recommendations were undertaken by two reviewers. Study authors were contacted to clarify study details if there were significant uncertainties in the study reports for a major finding.

We extracted data from the newly identified trials and included these in meta-analyses using methods from Cameron et al., 2018.[1] We undertook additional analyses to establish whether fall rates remained reduced after cessation of exercise programs, as physiologically, one would not expect benefits to last after program cessation. We undertook a new subgroup analysis of multifactorial interventions examining interventions that do or do not include staff educational approaches. Our analysis of vitamin D interventions for this review utilises fewer subgroups. It thus captures one additional study providing vitamin D and calcium supplementation within a multivitamin supplement in the main analysis.

Appendices

We also undertook an intervention component analysis (ICA) [4, 5] for the exercise interventions, a novel approach that is gaining popularity within research in the healthcare field around the world. The ICA involved systematically extracting trial authors' interpretations of trial components associated with effectiveness and synthesising these into themes using qualitative methods.

Fifteen new trials with data suitable for meta-analysis of fall outcomes were identified from our updated systematic review using Cochrane methods. Thus, findings from a total of 86 trials in RACS were considered in this review. A complete list of trials that met the inclusion criteria for the search update is provided in **Supplement 3A**, and supporting meta-analyses and forest plots are presented in **Supplement 3B**. The key interventions with evidence of effectiveness for fall prevention in aged care are summarised below.

Vitamin D supplementation

No new eligible trials were identified in this update. Therefore, the conclusions reached in the Cochrane 2018 review remain unchanged, primarily that vitamin D supplementation probably reduces the rate of falls (rate ratio [RaR] 0.72, 95% CI 0.55 to 0.95; I^2 = 62%; moderate certainty evidence) in older people in RACS.[1]The Cochrane 2018 review also concluded the impact of vitamin D on the number of people falling is unclear (RR 0.99, 0.90 – 1.08; I^2 = 12%; 6 trials, moderate certainty evidence); but that the number of fallers is probably reduced considering trials at lower risk of bias (risk ratio [RR] 0.83, 0.68 – 1.02; I^2 = 0%; 3 trials, moderate certainty evidence)but the confidence intervals include the possibility of a small increase in the number of people falling.

The aged care population included in these studies likely had low to very low serum vitamin D levels,[1] and an adequate dose of vitamin D supplementation for this population is recommended to be 800 to 1000IU daily.[6]

However, a recent Australian implementation trial in 41 RACS (ViDAus) reported difficulties in increasing the vitamin D supplementation rate of older people in RACS, with no significant change in supplement use after six months of an education and quality improvement intervention.[7] This suggests broader organisational and government support is likely to be needed.

Exercise

The systematic review update identified 17 RCTs with data suitable for meta-analysis. However, the trial findings were highly heterogeneous, and many trials have been small and of variable quality. The updated meta-analysis revealed that exercise probably reduces the number of falls while exercise is undertaken (RaR 0.69, 95%CI 0.50–0.96, P=0.03; I^2 = 85%; moderate certainty evidence) and the number of older people falling (RR 0.83, 95%CI 0.71–0.98, P=0.03; I^2=26%; moderate certainty evidence).

Exercise that is not sustained has little or no lasting effect on the number of falls when post-intervention follow-up periods are considered (RaR 1.02, 95%CI 0.81–1.28, P=0.87; I^2=57%; high certainty evidence) and probably has little or no sustained effect on the number of people falling (RR 1.05, 95%CI 0.90–1.23, P=0.54; I^2=22%; moderate certainty evidence).

Most trials examined a combination of exercise types. Effective trials of exercise recently conducted in residential aged care settings include:

- the Australian SUNBEAM trial utilising gymnasium equipment in a 6-month, individually prescribed progressive resistance training plus balance exercise in a group setting twice weekly for 1 hour with a further 6-month maintenance phase.[8] This program is relatively resource-intensive but cost-effective, with equipment shared between RACS and a single staff activities officer. Two activities officers and physiotherapists attending once per fortnight are recommended for program delivery.
- a less resource-intensive intervention involving resistance bands, mats and exercise balls was used by Irez et al. (2011)[9] in a small trial (N=60), which reduced the rate of falls during a program delivered in 1-hour sessions three times weekly.

- a small trial (N=71) of the Otago program, which utilises ankle weights, in addition to walking, in three 45-minute sessions weekly compared to walking alone, was effective in reducing the rate of falls.[10]
- a small Australian trial (N=60) involving older people with a diagnosis of dementia evaluated a 12-week multicomponent moderate-intensity group exercise program that comprised strength, balance, endurance and flexibility exercises. The program, delivered by a physiotherapist and delivered in one 45-minute session per week or three 15-minute sessions per week, reduced the number of falls demonstrated during the intervention period.[11]

Key features of effective exercise programs identified in our intervention component analysis [12] are:

- inclusion of exercises targeting strength and balance
- individualised exercise prescription
- moderate-intensity exercise
- sufficient funding to support older people to exercise

Dairy supplementation

The nutritional status of older Australian people in RACS is frequently considered poor, and as many as 68% of older people in residential care may be malnourished or at risk of malnutrition.[13] A 2021 trial[14] involving 60 Australian aged care services demonstrated that improving calcium and protein intake by providing additional dairy foods (milk, yoghurt and cheese) probably reduces the risk of falls and fractures (moderate certainty evidence) amongst older people replete in vitamin D and consuming two or fewer serves of dairy foods per day. The dairy foods added to the menu in the trial meant that older males met their dairy food serve requirements and older women met 88% of their dairy food serve requirements according to the Australian Dietary Guidelines.[15]

Medicines review

Medicines review as stand-alone intervention makes little or no difference to the rate or risk of falls (RaR 0.90, 95%CI 0.64–1.27, I^2=92%, P=0.54; 7 trials; high certainty evidence; RR 0.93, 95%CI 0.81–1.08, I^2=38%, P=0.35; 7 trials; low certainty evidence). However, medicines reviews are key components of many multifactorial fall prevention interventions, as discussed below. Detailed evidence is outlined in the additional discussion section.

Multifactorial interventions

In multifactorial interventions, an initial assessment is usually carried out by one or more health professionals. An intervention is then provided, recommendations given or referrals made for further action. Twelve trials of multifactorial interventions provided data suitable for meta-analysis, with trial findings overall highly heterogeneous. However, examining trial data according to whether the interventions included staff education indicates that multifactorial interventions, including educational approaches, probably reduce the number of falls (RaR 0.64, 95%CI 0.55 – 0.74; I2 = 23%; 8 trials; moderate certainty evidence) and number of people falling (RR 0.78, 95%CI 0.67 – 0.90; I2 = 0%; 6 trials; moderate certainty evidence). All included trials examined both individual and service-level fall risk factors, including assessment for environmental interventions and medicines review. Most also included exercise interventions. The findings of one study suggested that low-intensity interventions may be worse than usual care.[16]

Fall risk assessment

This systematic review based on Cochrane Collaboration methods included trials that examined both individual and service-level risk factors for falls. Several studies used specific fall risk assessments to identify fall risk factors. Many included environmental assessment and medicines reviews, and most included an exercise program as part of the intervention.

It is not useful to assess the risk of falling without implementing interventions. A cluster randomised trial conducted in 58 German RACS that received education on best practice fall prevention interventions (Meyer 2009; 1125 participants)[17] found that use of a fall risk-assessment tool (the Downton Index) in comparison with nurses' judgement alone probably makes little or no difference to the rate of falls or risk of falling (RaR 0.96, 95% CI 0.84 to 1.10; RR 0.99, 95% CI 0.85 to 1.16; moderate certainty evidence).

The presence of cognitive impairment may mean that the multifactorial fall risk assessment tool needs to be modified to make sure it is suitable for the older person, particularly if the older person has problems understanding one or more instructions. The Tinetti Performance Oriented Mobility Assessment (POMA) revealed some feasibility issues when used with older people with dementia living in RACS, with 41% of participants (n=75) having problems understanding one or more instructions.[18]

Trials not significantly reducing falls

Other newly identified trials that did not demonstrate a significant reduction in falls in our analyses examined assistive home technology (Lauriks et al. 2020, N = 54),[19] a model of ocular care (Man et al 2020, N = 178),[20] person-centred care (Richter 2019, N = 1,153),[21] 20-minute rounding (Roberts 2020, N = 41)[22] and a multifaceted podiatry intervention (Wylie 2017, N = 43)[23] (see Supplement 3B).

Additional discussion of evidence for fall risk factors

Cognitive impairment

When pooling studies of only older people with cognitive impairment, it appears that multifactorial interventions do not significantly reduce falls.[1] This relates to the heterogeneity of study findings.

For example, one trial showed that people who benefited from a multifaceted intervention that was comprised of staff and older people education on fall prevention, advice on environmental adaptations, progressive balance and resistance training, and hip protectors were those with more marked cognitive impairment.[24] In contrast, another study reported subgroup analysis based on levels of cognitive impairment and found that a multifactorial falls and injury prevention program was effective in older people with higher levels of cognition and not in older people with impaired cognition.[25]

Conflicting evidence on interventions for older people with cognitive impairment

Some fall prevention interventions in older people with dementia in RACS, which have been unsuccessful, include a behavioural advisory service for people with confusion,[26] and multisensory stimulation in a Snoezelen room.[27]

Conflicting evidence has been reported regarding the effectiveness of dementia care mapping.[28,29] Possible explanations for the lack of effectiveness of fall prevention in people with cognitive impairment or dementia include different underlying mechanisms for fall risk factors and possibly other additional risk factors.[30]

A small Australian trial (n=60) involving older people with a diagnosis of dementia evaluated a 12-week multicomponent moderate-intensity group exercise program which comprised strength, balance, endurance, and flexibility exercises.[11]The program was delivered by a physiotherapist and delivered in one 45-minute session per week or three 15-minute sessions per week. It reduced the number of falls demonstrated during the intervention period. However, it did not result in improvements in mobility assessed as timed-up and go test and gait speed. The low dose of exercise may have been insufficient to generate physiological changes necessary to improve gait.

Appendices

Delirium and fall prevention

There have been too few studies aimed at reducing falls in people with delirium to draw firm conclusions.[31] One trial aimed to identify medicines that may contribute to delirium risk and trigger a medicines review. This intervention significantly reduced delirium incidence but did not significantly reduce falls among older people in long-term care.[32]

Medicines

Cardiovascular Medicines

There is conflicting evidence on whether higher doses of antihypertensive medicines lead to an increased risk of falls.[33,34]

The risk of hip fracture may also be increased with the use of antihypertensives in the first 7-45 days following prescription.[35,36] However, a Cochrane review found that thiazides appear to reduce the risk of hip fracture, but randomised controlled trials are needed to confirm this finding.[37]

Cardiovascular-disease fall-risk-increasing medicines identified as vasodilators, antihypertensives, diuretics, beta-blockers, calcium channel blockers, renin-angiotensin system inhibitors, and α-adrenoceptor antagonists did not elevate the risk of falling in a study of 27 RACS in Sydney.[38]

Anticonvulsant medicines

Anticonvulsant medicines are associated with an increased risk of falls; however, studies have not used a clear definition to ensure that resulting directly from seizures were excluded.[39]There is conflicting evidence for the risk of falls and anticholinergic medicine use.

One longitudinal study found no significant association between anticholinergic medicine use and recurrent falls,[40] whereas two cohort studies found a significant association between anticholinergic medicines and injurious falls [41, 42] 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.[43]

Polypharmacy

A study of 532 older people living long-term in RACS found that the use of ten or more medicines increased the fall rate to 1.84/ person-years (95%CI 1.60 to 2.09) and predicted all-cause mortality. [41]

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.[44] Polypharmacy has also been associated with an increased risk of fall-related fractures in older people aged 65 years and over.[45]

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.[46]

Evidence

Two published studies have evaluated the efficacy of medicines reviews by a pharmacist as a single intervention in RACS.[47,48] In one study, the rate of falls in the intervention group was lowered significantly compared with the control group (0.8 falls per participant in the intervention group, compared with 1.3 falls per participant in the control group).[42] In a second study examining the transition period between the hospital and RACS, found that the provision of a pharmacist transition coordinator improved the quality of prescribing but did not reduce falls (an additional finding to the main study endpoints).[48]

Two other studies reviewed medicines as part of a multifactorial fall intervention in RACS.[49,50] The use of fall risk-increasing medicines (benzodiazepines, antidepressants, diuretics and neuroleptics) and multiple medicines use were evaluated and adjusted to minimise adverse effects.

One study found a significant reduction in the number of older people who had recurrent falls;[50] and the other study found a reduction in falls in people with a Mini-Mental State Examination (MMSE) score of greater than 19.[49]

Several recent systematic reviews have evaluated the efficacy of medicines reviews or deprescribing plans for preventing falls in older people. One review involved 1,305 participants in clinical trials. Only one of the trials was in a RACS. The primary findings were that fall risk-increasing medicine withdrawal strategies (mostly targeting centrally acting medicines) did not significantly reduce fall rates (RaR:0.98, 95% CI:0.63,1.51) in older people over a 6-to-12-month follow-up period.[51]

Another review, specifically set in RACS, showed that medicines review-directed deprescribing interventions reduced the number of older people who fell by 24% (OR 0.76, 95%CI 062 – 0.93) (4 studies, 2108 participants).[52] A more recent systematic review included a meta-analysis investigating medicines reviews or deprescribing plans in RACS.[53] The main findings were that the implementation of these initiatives did not significantly reduce either the number of older people who fell (RR=0.86, 95% CI=0.72-1.02, 5 studies) or the number of falls (RaR=0.93, 95% CI 0.64-1.35, 7 studies). 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, the authors suggested these interventions be included in multimodal strategies due to the multifactorial nature of falls (rather than implemented as a stand-alone fall prevention strategy).

Feet and footwear

A pilot randomised controlled trial evaluating a podiatry intervention involving 43 participants has also been conducted in the nursing care home setting. This study found that it was feasible to deliver the interventions in that 35% of participants in the intervention arm completed the exercise program, and 48% reported using the prescribed orthoses all or most of the time.[54]

Syncope

There is limited evidence for currently used therapies to manage orthostatic hypotension due to the lack of good quality, randomised, placebo-controlled trials.[55]

A randomised controlled trial found a reduction of falls by 70% in people with accurately diagnosed cardioinhibitory carotid sinus hypersensitivity receiving cardiac pacing.[56] However, a follow-up randomised, double-blind, crossover, placebo-controlled trial found no effect on fall rates in older people with cardioinhibitory carotid sinus hypersensitivity, receiving cardiac pacing.[57]

Dizziness

Vestibular dysfunction has been indicated in approximately 14% of older people in primary care[58] and 50% of people older than 70 years who have been referred to a dizziness or balance clinic for evaluation.[59]

A study of 66 older people who lived in the community and who had sustained wrist fractures as a result of an accidental fall were more likely to have vestibular asymmetry on testing than an age-matched group of non-fallers.[60] A prospective study of 55 older people with multisensory dizziness (dizziness attributed to age and deterioration of the sensory receptor system) found that those with signs of vestibular asymmetry (as measured with the headshake test) were at an increased risk of falls.[61] Multivariate analyses of 21,782 people in the US National Health Interview Survey found those with bilateral vestibular hypofunction had a 31-fold increased odds of falling compared with all respondents, with 25% reporting a recent fall-related injury.[62]

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 people were more likely to have sustained a fall in the previous three months.[63]

Diagnostic tools for assessing 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.[64] 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.[65] The study found that easily obtainable clinical information could predict older 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.[66] The Dizziness Handicap Inventory and seven-item sum score [65] 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 psychiatric cause - psychotherapy and/or psychotropic medicines
- Polypharmacy - medicines reduction
- 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 older people.[67]

Vision

Considerable research in the community setting has linked reduced vision with an increased risk of falls or fractures. The risk of multiple falls is reported to increase 2.6 times if visual acuity is worse than 6/7.5.[68] Similarly, visual acuity of 6/15 or worse nearly doubles the risk of hip fracture, and this risk is greater with even lower visual acuity levels.[69]

Some prospective studies show that other visual functions have also been associated with an increased risk of falling. These visual functions include reduced contrast sensitivity,[70,71] poor depth perception[72,73] and reduced visual field size.[68,74-77] Impaired visual acuity, depth perception, contrast sensitivity and visual field loss are also associated with an increased risk of low-fragility hip fractures.[78] Fear of falling is more frequently reported in older people with visual deficits.[79,80]

Diabetic retinopathy can reduce visual field size and may increase the risk of falls;[81] however, 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.[82] Another study found that individuals with mild or moderate diabetic retinopathy had significantly elevated odds of falling in comparison to people with diabetes without diabetic retinopathy.[83]

Only one randomised controlled trial of a vision intervention has been conducted in RACS.[84] In this trial, conducted in 38 Australian RACS, visually impaired older people were cluster randomised to usual care (n=83) (referral to an external eye care provider) or a novel ocular care model (n=95) consisting of a tailored and comprehensive within-site eye examination and care rehabilitation pathway. While the intervention significantly improved near visual acuity, emotional well-being and perceived burden of vision-related symptoms, it did not reduce the rates of falls and injurious falls.

The findings of one large RCT, however, imply that care is required when prescribing glasses.[85] In this trial involving 616 older people, those assigned to the intervention group received vision-related treatments (most often a new pair of glasses). During the follow-up period, these participants reported significantly more falls than those in the control group (RR:1.57, 95% CI:1.20,2.95). This unexpected finding may have been due to the older people in the intervention group often receiving large changes to prescriptions, which they might have needed considerable time to adapt to while being at greater risk of falling during this period. Thus, time for adaptation to new glasses is recommended, and optometrists are advised to gradually change prescriptions and to counsel older people as to the likely short-term risks of a new prescription.

One RCT has evaluated the effect of providing regular multifocal users at increased risk of falls with a second pair of tinted single-lens glasses for use while moving around.[86] The intervention was effective in preventing falls in the sub-group of people who more regularly undertook outside activities. In this group, there were significant reductions in all falls (IRR:0.60, 95% CI:0.4,0.85), falls outside the home (IRR:0.61, 95% CI:0.42,0.87) and injurious falls (IRR:0.62, 95% CI:0.42,0.92).[86] However, there was a significant increase in outside falls in people who undertook little outside activity in the intervention group (IRR:1.56, 95% CI:1.11,2.19).

Cataract surgery

Cataract surgery has been shown to be effective in reducing falls in older people in randomised controlled trials[87,88] and prospective observational studies.[89-92] The first RCT,[88] involving 306 women aged 70 years and over, examined cataract surgery for one eye and found the fall rate in the operated group over one year was reduced by 34% compared with the controls (IRR:0.66, 95% CI:0.45,0.96). The second [87] follow-on RCT evaluated whether surgery on the second eye led to further reductions in falls, with the rationale that improving vision in both eyes would lead to better depth perception and, subsequently, fewer falls. Over the one-year trial period, the fall rate in the intervention group was reduced, although not significantly, by 32% (IRR:0.68, 95% CI:0.39,1.19).

The prospective cohort studies, whilst uncontrolled, add strong supporting evidence that cataract surgery can reduce fall rates.[89-92] These studies have found that first-eye cataract surgery significantly reduces falls and that second-eye surgery provides additional benefits for fall prevention. For example, in a cohort of 407 older people, Keay et al. found that the incidence of falls among older people referred for cataract surgery was 31% lower after the first eye surgery and a further 50% lower after the second eye surgery.[89] These findings indicate that timely cataract surgery for both eyes not only optimises vision in older people with cataracts but also provides greater protection against falls.[89]

Further indirect evidence for cataract surgery for preventing falls comes from a cohort study of over 1 million US Medicare beneficiaries aged 65 years and older with a diagnosis of cataract. This study found that older people who had cataract surgery had significantly lower odds of hip fracture within one year after surgery compared with older people who had not undergone cataract surgery.[93]

Finally, the expedited cataract RCTs have provided evidence that older people on waiting lists for cataract surgery are at an increased risk of falls and fractures.[87,88] While waiting for surgery, these individuals may benefit from environmental safety interventions to address potential hazards, lack of equipment and risky behaviours that predispose people with severe visual impairment to falls.

Hearing

Several studies have examined hearing impairment in relation to fall risk.[94-99] Most of the studies included large samples from longitudinal studies and were conducted in community settings. Some studies measured hearing impairments using audiometric measurements [94,96,99,100] whereas others based their hearing impairment measure on self-report.[95,97,98,101]

As self-reporting underestimates hearing loss, the studies that measured hearing loss using audiometry are, therefore, likely to yield more valid results.[102]

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[98-101] and the prospective Finnish Twin study[94] found hearing impairment increased fall risk, whereas one retrospective study[95] and two large studies using prospective falls data did not find this to be the case.[96,97] 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 that may not have been representative of the residential aged-care service population as a whole. Although no meta-analysis has been undertaken, findings of studies to date indicate that hearing impairment contributes to falls in older people.

A pilot study conducted in the 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 older people with self-reported hearing impairment.[106]

Environment

There is insufficient data to determine what effect environmental modification on its own has on reducing falls in RACAS. This is mainly because individual trials either did not look at the effectiveness of these interventions in isolation or because the stand-alone environmental modification trials were of a low quality.

Several good-quality trials have demonstrated that a multifactorial approach that includes the environment and the culture of the RACS can prevent falls for older people.[107-109]

One study with a sample of 439 older persons reduced falls by 40% (IRR=0.6, 95%CI:0.50-0.73)[109] through a worker training program. The program included environmental modification (such as removing furniture that posed a risk and keeping floors dry); exercises for older people to improve muscle strength, balance, gait and transfers; repair and provision of mobility aids, equipment and fitted footwear; medicines review; hip protectors for older people with the highest fall risk; and worker team support and reporting systems.

Flooring

Six non-controlled trials undertaken in hospitals and residential care services provide initial evidence that low-impact flooring can significantly reduce injuries and prevent fractures. In the most recent trial, fall and fall-related injury rates between low-impact flooring compared to standard vinyl flooring were compared in a prospective, non-randomised, controlled study in 20 bedrooms within a subacute geriatrics ward.[110] The study found the fall rate did not differ between the low-impact floor and control floor bedrooms, which indicates the compliant surface did not cause unstable gait for the older people walking on it. However, fall-related injuries were significantly less frequent (22% of falls versus 34% of falls on control flooring, p:0.02), and fewer fractures occurred from falls on the low-impact floor compared with the control floor (0.7% vs. 2.3% respectively).

Following the above trials, a four-year, randomised superiority trial of compliant (low stiffness) flooring was conducted in a Canadian RACS, where older people were randomly allocated to rooms with 2.54 cm thick compliant (low-stiffness) rubber flooring or plywood flooring with identical overlying vinyl floor covering and over pre-existing concrete floors.[111] Compliant flooring did not affect the odds of having serious fall-related injuries. It is possible that the compliant flooring used was sub-optimal, and compliant flooring with greater impact attenuation may have prevented fall injuries. However, further trials are required to confirm this.

Soft surfaces can impair balance and gait in older people. The disadvantage of low-impact floors is their rolling resistance when moving heavy equipment such as beds or hoists. Concerns have been raised about potential injuries to workers due to the increase in force required to push wheelchairs and other objects.[112]

Monitoring and observation

Observational studies have looked at technologies for detecting falls, such as infrared movement detectors, fall alarms (which sound when the older person is already on the floor), bed and chair alarms (which detect when an older person starts to move from a bed or chair), and movement alarms. However, the studies were generally of poor quality. A systematic review concluded that there are not enough trials in hospitals and RACS that investigate specific interventions, such as alarms.

A randomised controlled trial conducted in 14 RACS in New Zealand used a logo and coloured dots to flag fall risk.[113] The logo (a flower with a falling leaf) was displayed on a wall in the older person's room. Each coloured dot indicated a particular fall risk and had a corresponding strategy for workers to minimise that fall risk. This low-intensity intervention aimed to raise staff awareness. However, it was associated with increased falls in the intervention group, compared with baseline, emphasising the importance of incorporating appropriate interventions with the logo or alert rather than using the alert as a sole intervention.

Sitter programs

There is no strong evidence that providing sitters reduces inpatient falls in acute hospital settings.[114] In a recent systematic review, two Australian studies provided very low certainty evidence that adding sitters to usual care reduces falls.[115,116] Moderate evidence from eight studies found that video monitoring was at least as effective as sitters in preventing falls and reduced the need for sitters.

Sitter programs require planning, resources, education, investment (particularly for paid people) and ongoing coordination. An observational study in Australian hospitals found that a limitation of volunteer sitters is that they are typically only available during 'business' hours.[115] A feasibility study run in Australian hospitals found that providing 24/7 surveillance coverage by volunteers would require an additional 15 volunteers a week.[116] Both studies found some tensions between volunteers and nursing staff, arising from a lack of clarity about the volunteer's role or nurses feeling that volunteers were demanding their time. However, because these studies were conducted in the hospital setting, it is unclear whether similar situations would occur in the RACS setting.

Response alarms

One prospective cohort study has investigated the use of alarms by people older than 90 years of age, living either in their own homes or in a RACS.[117] Seventy per cent had a call alarm (57 out of 81 participants). However, only 78% (28 out of 36 participants) used the alarm after a fall. Reasons for not using the alarm included not wearing it, wearing it but not wanting to use it (wanting to stay independent, fearful of being taken to hospital) and difficulty activating it.

Automatic fall detection devices

A systematic review of wearable and non-wearable fall detection devices found that there are a number of devices that are able to measure different aspects of a fall; however, there has been little real-world testing of devices, and it is difficult to compare accuracy between devices.[118] There are a number of limitations to these types of devices:

- Older people must remember and choose to wear the device.
- Devices are dependent on battery power.
- There may be false alarms.
- People may have privacy concerns.
- Devices may be limited to a specific space.

Another systematic review of body-worn sensors for fall detection also found it difficult to compare studies with standardisation of measuring and reporting falls needed, and there was a lack of real-world trials.[119]

One study has performed a systematic comparison of thirteen published fall detection algorithms tested on a database of 29 real-world falls and found that algorithms that were successful at detecting simulated falls but did not perform well with detecting real-world falls with a high number of false alarms.[120]

Smartphones attached to the waist could be a feasible option for older people for fall detection, with one study finding high specificity and sensitivity of fall detection compared with an independent accelerometer.[121] 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 person.

Restrictive Practices

Bed rails are sometimes used as a type of restraint; however, a survey of UK medical wards found that rails were being used inappropriately for both confused older people and those needing assistance to mobilise.[122] 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.[123] Another Cochrane review also reported that educational programs targeting nursing staff might not be effective in reducing the use of physical restraints in geriatric long-term care.[124] The review concluded that it remained unclear which components should be included in educational programs aiming to reduce physical restraints.[124]

An observational study from Finland recorded the use of psychotropic medicines and other medicines as chemical restraints in long-term care.[125] They found that 33% received three or more psychotropic medicines regularly, and 24% received two or more benzodiazepine derivatives or related medicines regularly. The authors concluded that psychotropic medicines were used as chemical restraints in these long-term care wards.[125]

Appendices

Hip protectors

The 2014 Cochrane Collaboration review contains tables that summarise the randomised trials of hip protectors - see https://www.thecochranelibrary.org and search for 'hip protectors'.

There is some evidence that, when worn correctly, hip protectors may prevent hip fractures in older people in residential aged care services (RACS).[126,127] Hip protectors can, therefore, be used as part of a multifactorial fall and injury prevention intervention in RACS, although they will not prevent falls or protect other parts of the body.[128]

A large RCT performed in Finland in 2000 investigated the effect of hip protector use in frail but ambulatory people.[129] The intervention resulted in a 60% reduction in the risk of fracture. However, because 31% of eligible people in this study refused to wear their hip protectors, it is not clear whether the results can be generalised to the wider population.

The issue of adherence was addressed in a 2003 study where hip protectors were provided to 459 people and compared with 483 controls.[130] Before implementing the intervention, staff and older people were provided with a structured education session, which included information about the risk of hip fracture, prevention strategies and the effectiveness of hip protectors. The results showed that older people wore hip protectors during 54% of all falls in the intervention group, compared with 8% of falls in the control group, and there was a 40% reduction in the relative risk of hip fracture in the intervention group.

Another study included the use of hip protectors as part of a multiple intervention in the RACS setting.[131] Older people at increased risk of hip fracture were offered hip protectors, and 72% initially agreed to wear them. Results showed a reduction in the number of hip fractures in the intervention group overall; however, adherence with hip protector use was not reported, and the use of co-interventions aimed at reducing the risk of falls makes it difficult to determine the effectiveness of hip protectors alone.

Similarly, a large, multiple-intervention program run in Germany provided hip protectors to older people who were able to stand.[132] There was no significant difference in hip fracture rates between the intervention and control groups; however, no hip fractures occurred while the older people were wearing the hip protectors properly. Issues identified with this study included poor older person adherence to using the hip protectors, and lack of RACS workers support with their use and provision.

A 2014 Cochrane review included 19 studies (including those mentioned above) where hip protectors were used as an intervention for preventing hip fractures in RACS. Pooling of data from 14 studies (n=11,808) provided moderate quality evidence that hip protector use in this population has a small reduction in hip fracture risk without increasing the frequency of falls (RR 0.82, 95% CI 0.67-1.00).[126] The authors also concluded that poor acceptance and adherence are barriers to hip protector use and that more attention needs to be paid to factors that influence acceptance and adherence.

Facilitators and barriers to hip protectors acceptance and adherence in long-term care services were categorised in a subsequent review under four main categories:

- system - service commitment, staff shortages
- caregiver - belief in the efficacy of protectors, negative perceptions
- older person - clinical risk factors for falls and related fractures, acute illness, and
- product - soft shell, discomfort.[133]

Vitamin D

A high-quality systematic review looked at interventions that included vitamin D supplementation for preventing falls in the hospital and RACS settings.[134] The review included eight studies (n=9278), four of which were similar enough for the 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 have low serum vitamin D.

The findings of a study of the alfacalcidol form of vitamin D supplementation in non-vitamin D-deficient older people in the community support 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.[134]

The Nottingham Neck of Femur study concluded that vitamin D administered orally or injected increases bone mineral density and decreases falls, and that calcium co-supplementation may help.[135]

Risks of dose of vitamin D

There is evidence in community settings that high doses of Vitamin D supplementation may result in an increased 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.[136] 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.[137]

Post-fall management

A meta-analysis of interventions for improving the ability to rise from the floor showed no improvement in time to rise from the floor; however, a sub-group analysis on resistance training interventions showed a trend towards significance. Limitations were noted 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 have multiple comorbidities.

Appendices

Supplement 3A.
Randomised controlled trials in aged care settings published 2017 – 2021, meeting the inclusion criteria of Cameron et al. 2018, reporting data suitable for meta-analysis of the rate of falls or risk of falling.

Reference Study type	Country	Participants	ProFANE	Intervention vs. comparison
Arrieta 2019 [138] RCT	Spain	N = 112 long-term nursing home **Age**, years, mean (SD): Intervention group: 85.1 (7.6) Control group: 84.7 (6.1)	Exercise - Multiple (Balance and functional, Strength/ resistance)	**Intervention:** Individualised and progressive multicomponent exercise at moderate intensity in a 6-month program **Control:** Routine low-intensity activities that are usually offered to older people: memory workshops, reading, singing, soft gymnastics, etc.
Brett 2021 [11] RCT	Australia	N=60 nursing home residents with dementia **Age**, years, mean (range): 85 (58-100)	Exercise - Multiple (Balance and functional, Strength/ resistance)	Multimodal exercise (balance, strength, endurance and flexibility exercises) led by physiotherapist, moderate intensity **Intervention A:** 45min, once per week **Intervention B:** 15min, 3 times per week **Control:** usual care
Curtin 2019 [139] RCT	Ireland	N=130 hospitalised older people with acute medical or surgical illness and consequently required long-term nursing home care **Age**, years, mean (SD):85.0 (5.7) **Female:** 62%	Medicines – deprescribing	**Intervention:** Medicines advice based on the STOPPfrail criteria deprescribing tool and the medicines withdrawal plan devised by the research physician and was communicated directly to the participant's attending physician and documented in the patient's medical record **Control:** Usual care in which the attending physicians and ward-assigned pharmacist conduct medicines reviews
Dhargave 2020 [140] RCT	India	N=163 geriatric home s residents **Age,** years, mean (SD): 74.6 (8.5) **Female:** 53%	Exercise - Multiple (Balance and functional, Strength/ resistance	**Intervention:** One education session on fall prevention at the beginning of the study received a supervised exercise program for the first week and a home-based exercise program for 3 months **Control:** education session only.

Appendices

Reference Study type	Country	Participants	ProFANE	Intervention vs. comparison
Hewitt 2018 [141] Cluster RCT	Australia	N (clusters)=16 residential aged care N=221 permanent residents **Age**, years, mean (SD): 86 (7)	Excise – Multiple (Balance and functional, Strength/ resistance)	**Intervention:** Individually prescribed supervised progressive resistance training plus balance exercise performed in a group setting for 50 hours over a 25-week period, followed by a maintenance period for 6 months. **Control:** usual care
Jahanpeyma 2020 [10] RCT	Turkey	N=72 nursing home residents with high fall risk (assessed using the Itaki Fall Risk Scale) **Age**, years, mean (SD) Intervention: 74.6 (5.9) Control: 75.8 (4.5)	Exercise – Balance and functional	**Intervention:** Otago exercise program (3 days strength and balance for 45 mins and 3 days walking per week) for 12 weeks **Control:** walking 30min/day, 3 times per week.
Iuliano 2020, 2021 [14, 142] Cluster RCT	Australia	N (clusters)=60 (recruited); 54 (analysed) N=7195 permanent residents of aged care homes receiving ≤2 dairy serves daily **Age**, years, mean (SD) **Intervention:** 86 (2.3) **Control:** 86 (2.2)	Nutrition	**Intervention:** Protein and calcium supplementation through dairy foods daily provision **Control:** usual diet

Appendices

Reference Study type	Country	Participants	ProFANE	Intervention vs. comparison
Lauriks 2020 [19] Cluster RCT	The Netherlands	N (clusters)=5 N=54 inpatient care group home residents with dementia and 25 health professionals **Age**, years, mean (SD) **Intervention:** 84.3 (5.6) **Control:** 83.1 (7.1)	Environment	**Intervention:** Implementation of assistive home technology. **Control:** usual care
Logan 2021 [143] Cluster RCT	UK	N (clusters)=84 aged care homes N = 1,657 residents **Age**, years, mean (SD) **Intervention:** 86 (8.6) **Control:** 84.2 (9.7)	Multifactorial intervention	**Intervention:** Guide to Action for Care Homes (GtACH): a multifactorial fall prevention program **Control:** usual care
Man 2020 [20] Cluster RCT	Australia	N (clusters)=38 aged care services N=178 residents with visual impairment **Age**, years, mean (SD) **Intervention:** 85.2 (7.4) **Control:** 82.5 (9.7)	Social environment-service model change	**Intervention:** Residential ocular care model comprising a tailored and comprehensive within-site eye examination and care rehabilitation pathway **Control:** usual care involving referral to an external eye care provider

Appendices

Reference Study type	Country	Participants	ProFANE	Intervention vs. comparison
Richter 2019 [21] Cluster RCT	Germany	N (clusters)= 37 nursing homes N=1153 nursing home residents **Age**, years, mean (SD) **Intervention:** 84.0 (9.5) **Control:** 84.1 (9.1)	Social environment	**Intervention:** Nursing homes received educational interventions on person-centred care and a continuous supervision programme in addition to medicines reviews for individual patients, and physicians had access to 2 hours of continuing medical education. **Control:** Medicines reviews for individual patients and access to 2 hours of continuing medical education only.
Roberts 2020 [22] Pilot RCT	Australia	N=41 aged care home residents with high fall risk (assessed using PH-FRAT) **Age**, years, mean (IQR) **Intervention:** 87 (81 to 92.8) **Control:** 85 (80 to 92.5)	Social environment	**Intervention:** 20-min rounding observations marked in rounding sheet **Control:** usual care (residents checked according to care needs).
Toots 2019 [144] Cluster RCT	Sweden	N (clusters)= 36 nursing homes N=186 nursing home residents with dementia **Age**, years, mean (SD): 85.1(7.1)	Exercise – Multiple (balance and functional, resistance)	**Intervention:** High-intensity functional exercise program, 2-3 times per week (each session: 45 minutes) for 4 months (40 sessions in total). **Control:** seated attention control group activity, 2-3 times per week for 4 months.
Varela 2018 [145] RCT	Spain	N=74 long-term aged care home residents **Age**, years, mean (SD) **Intervention:** 77.9 (8.8) **Control:** 83.6 (7.1)	Exercise-general physical activity	**Intervention:** Self-selected intensity of cycling at least 15 minutes per day for 15 months during recreational activities time. **Control:** usual care

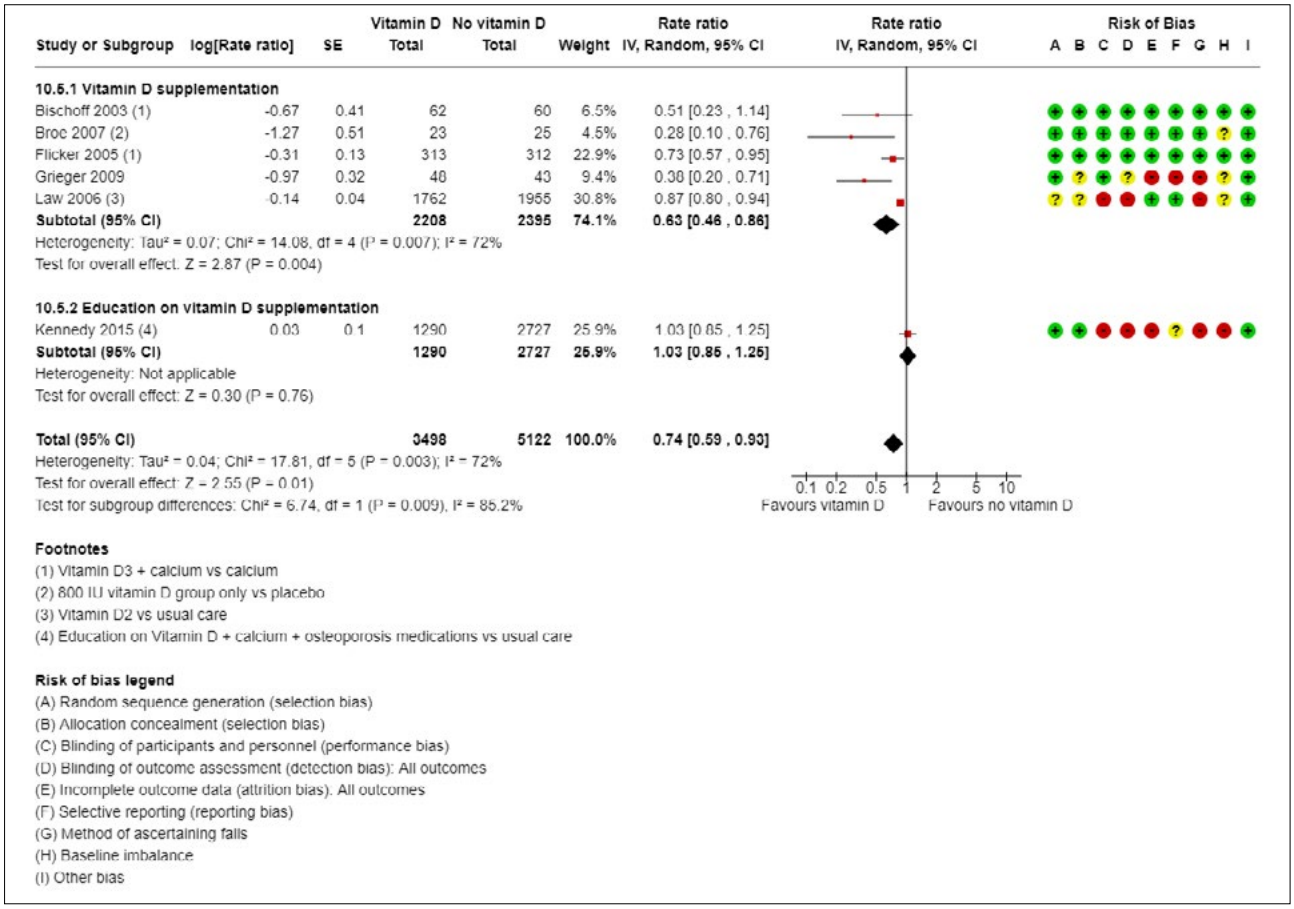
Reference Study type	Country	Participants	ProFANE	Intervention vs. comparison
Wylie 2017 [23] Pilot RCT	UK	N=43 aged care home residents with a history of falls **Age**, years, mean (SD) **Intervention:** 86.9 (6.2) **Control:** 85.9 (7.8)	Single-Additional podiatry	**Intervention:** 3-month podiatry intervention including core podiatry care, foot and ankle exercises, orthoses and footwear provision +usual care **Control:** usual care (core podiatry) that included routine nail and callus maintenance

Appendices

Supplement 3B.
Updated meta-analyses, searches to December 2021 (funnel and forest plots)

Vitamin D supplementation

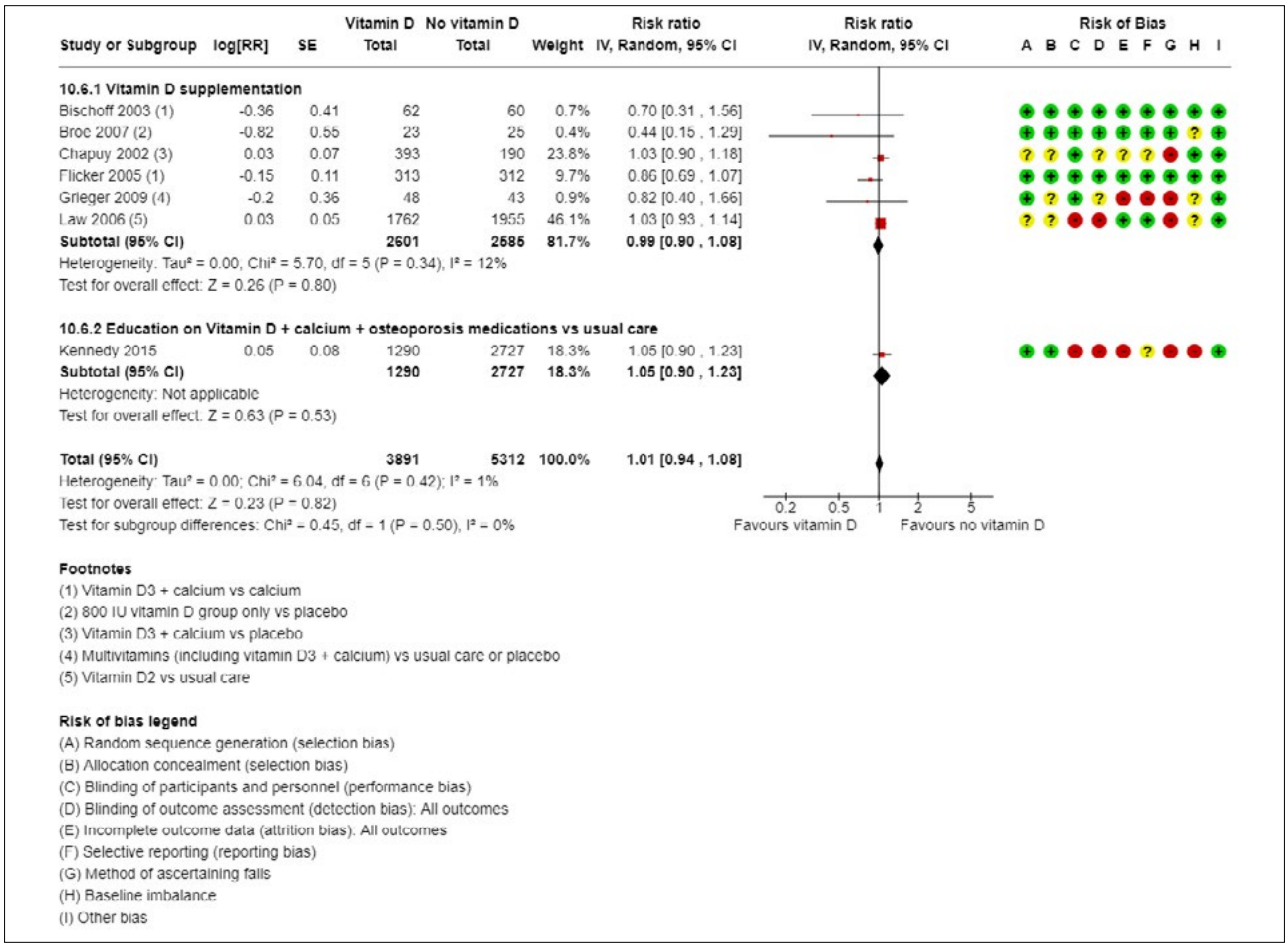
Rate of falls:



Risk of bias sensitivity analysis: overall 0.71 (0.48 – 1.05) (vitD supplementation subgroup 0.56, 0.34-0.93)

Appendices

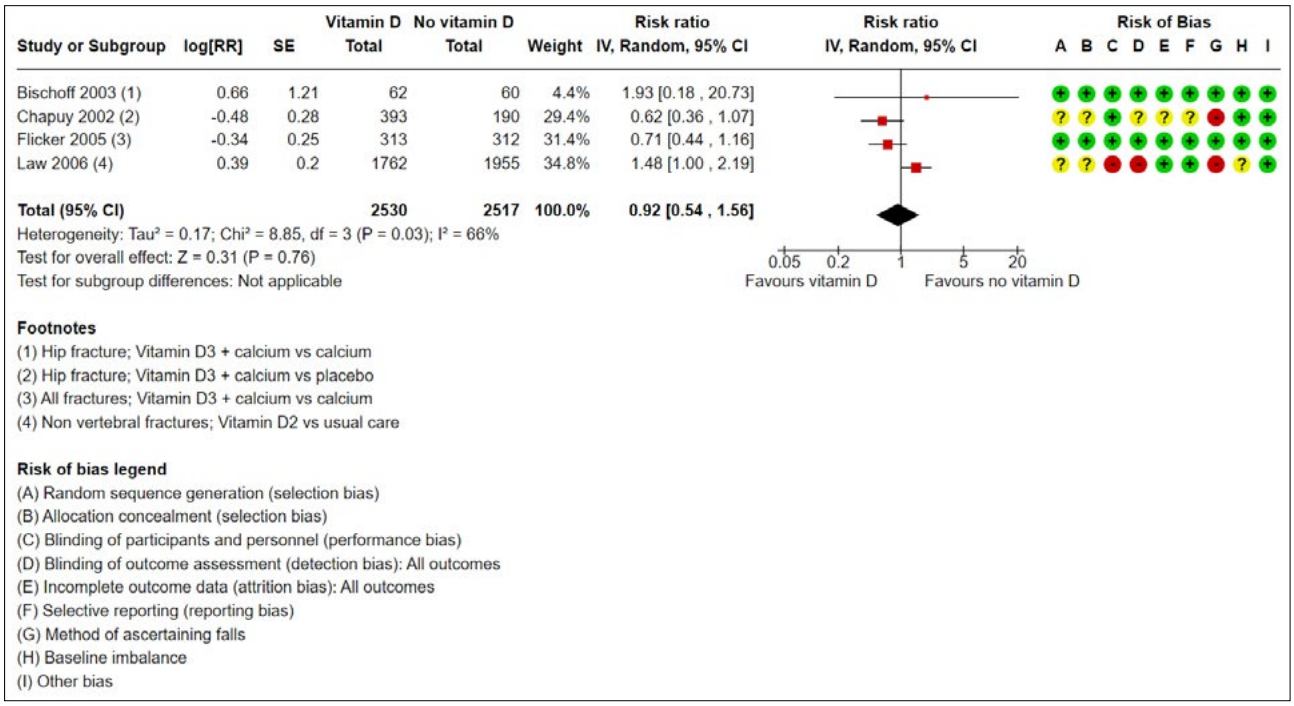
Risk of falling:



Risk of bias sensitivity analysis: overall 0.92 (0.75, 1.13) I2 = 39% (vit D supplementation subgroup 0.83, 0.68 – 1.02, I2 = 0%)

Appendices

Risk of fracture:



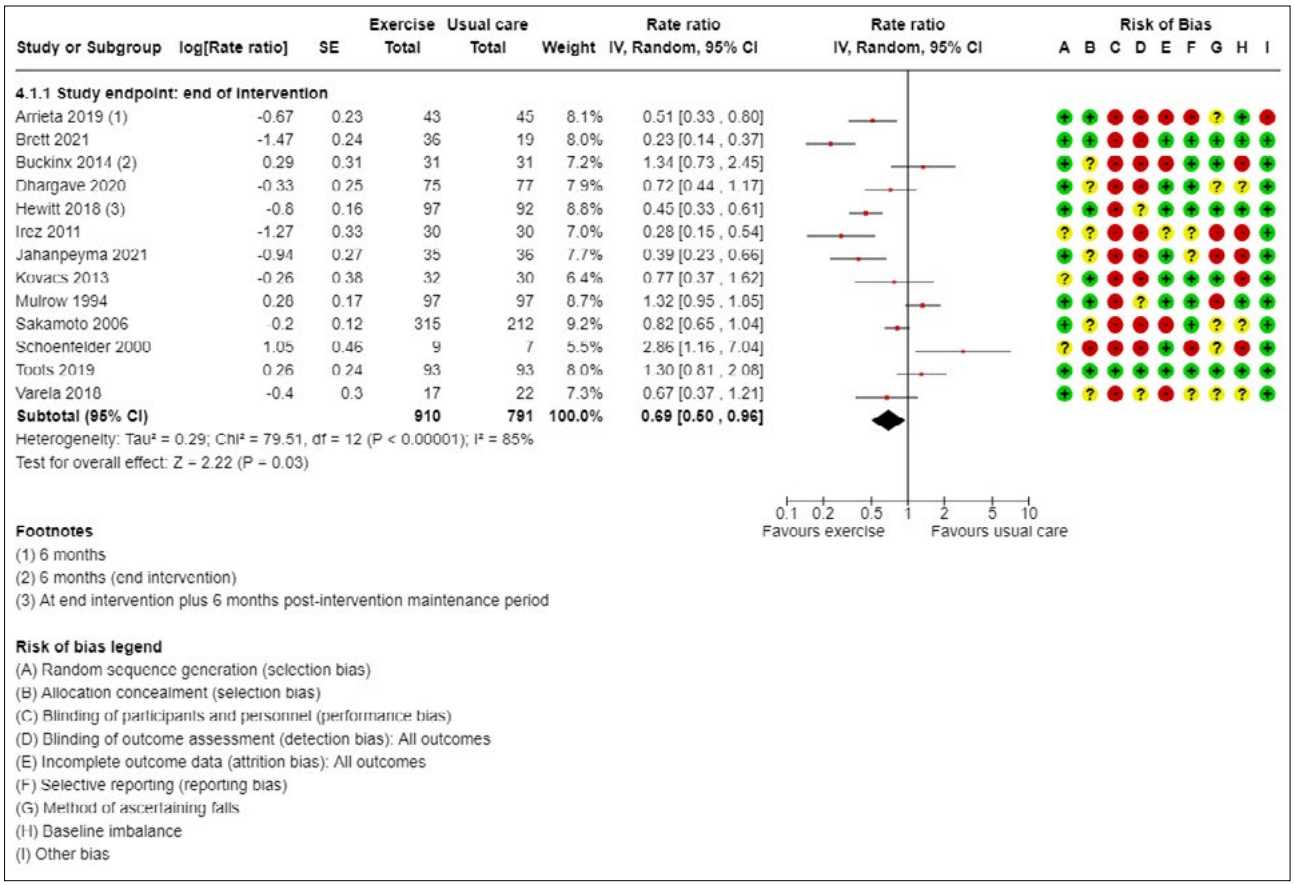
Risk of bias sensitivity analysis: RR 0.74 (0.46 – 1.20)

Appendices

Exercise

Analysis by study endpoint:

Rate of falls:



Study or Subgroup	log[Rate ratio]	SE	Exercise Total	Usual care Total	Weight	Rate ratio IV, Random, 95% CI
4.1.1 Study endpoint: end of intervention						
Arrieta 2019 (1)	-0.67	0.23	43	45	8.1%	0.51 [0.33 , 0.80]
Brett 2021	-1.47	0.24	36	19	8.0%	0.23 [0.14 , 0.37]
Buckinx 2014 (2)	0.29	0.31	31	31	7.2%	1.34 [0.73 , 2.45]
Dhargave 2020	-0.33	0.25	75	77	7.9%	0.72 [0.44 , 1.17]
Hewitt 2018 (3)	-0.8	0.16	97	92	8.8%	0.45 [0.33 , 0.61]
Ircz 2011	-1.27	0.33	30	30	7.0%	0.28 [0.15 , 0.54]
Jahanpeyma 2021	-0.94	0.27	35	36	7.7%	0.39 [0.23 , 0.66]
Kovacs 2013	-0.26	0.38	32	30	6.4%	0.77 [0.37 , 1.62]
Mulrow 1994	0.28	0.17	97	97	8.7%	1.32 [0.95 , 1.85]
Sakamoto 2006	-0.2	0.12	315	212	9.2%	0.82 [0.65 , 1.04]
Schoenfelder 2000	1.05	0.46	9	7	5.5%	2.86 [1.16 , 7.04]
Toots 2019	0.26	0.24	93	93	8.0%	1.30 [0.81 , 2.08]
Varela 2018	-0.4	0.3	17	22	7.3%	0.67 [0.37 , 1.21]
Subtotal (95% CI)			**910**	**791**	**100.0%**	**0.69 [0.50 , 0.96]**

Heterogeneity: Tau² = 0.29; Chi² = 79.51, df = 12 (P < 0.00001); I² = 85%

Test for overall effect: Z = 2.22 (P = 0.03)

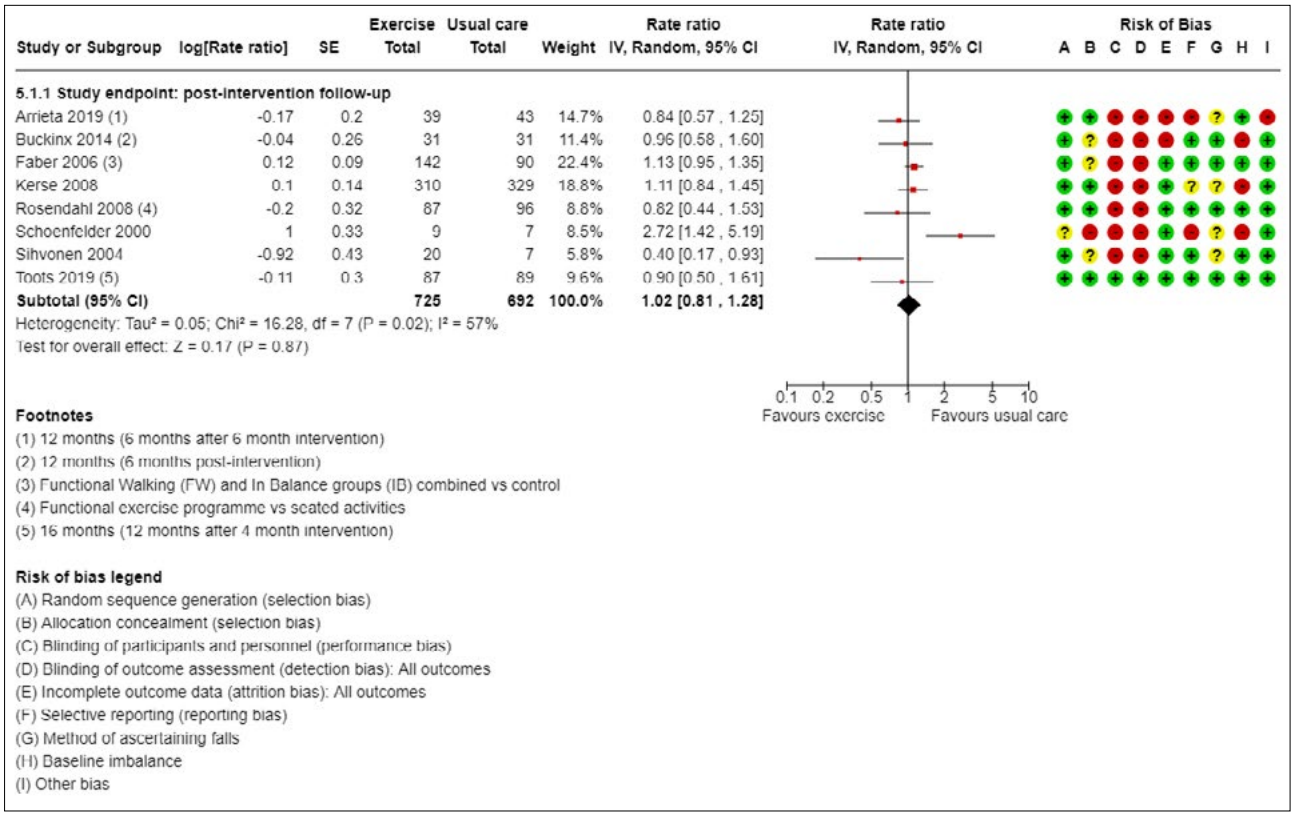
Footnotes

(1) 6 months
(2) 6 months (end intervention)
(3) At end intervention plus 6 months post-intervention maintenance period

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

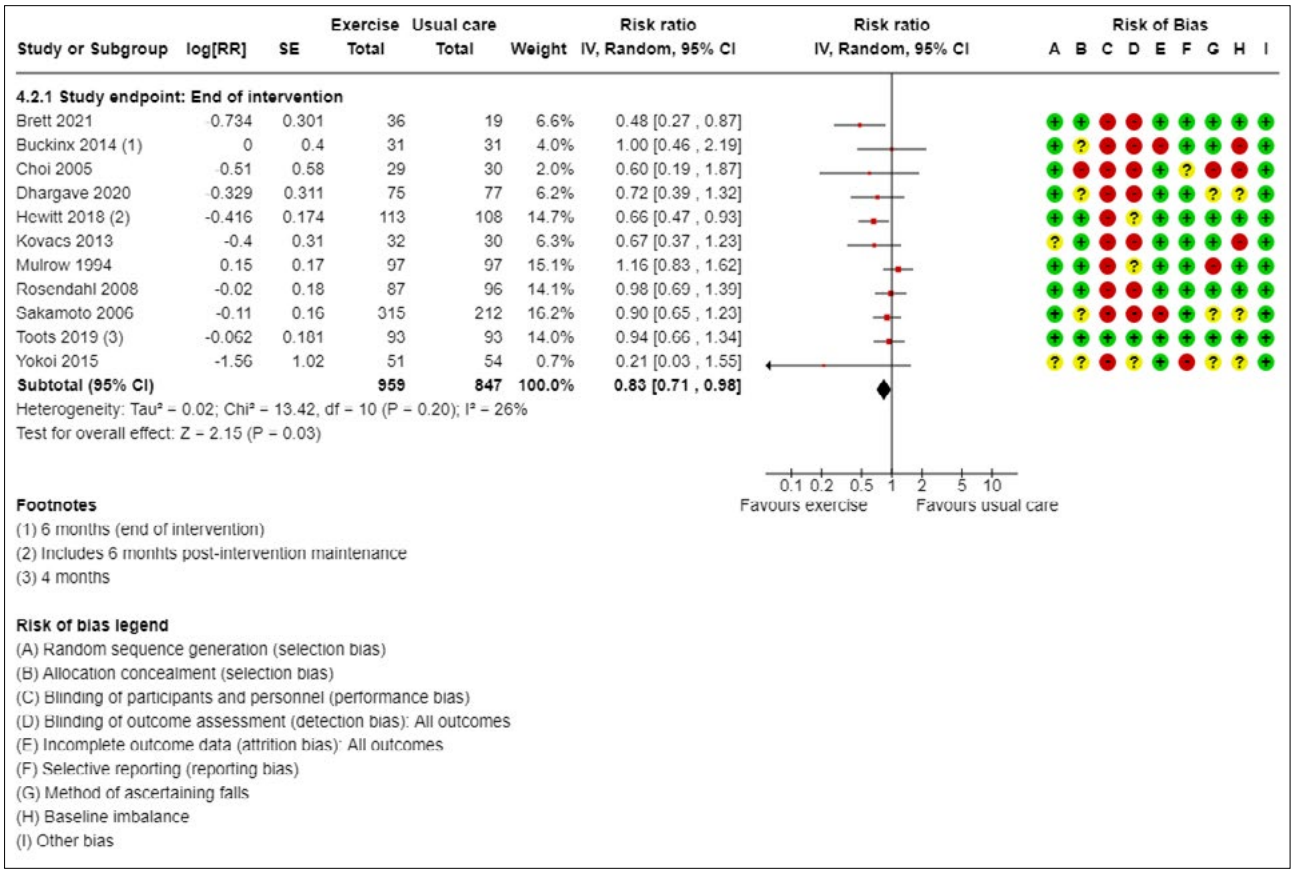
Appendices



Sensitivity analysis (RoB): End of intervention (4 studies) 0.55 (0.29, 1.07); Post-intervention follow-up (4 studies) 0.87 (0.59 – 1.26)

Appendices

Risk of falling:



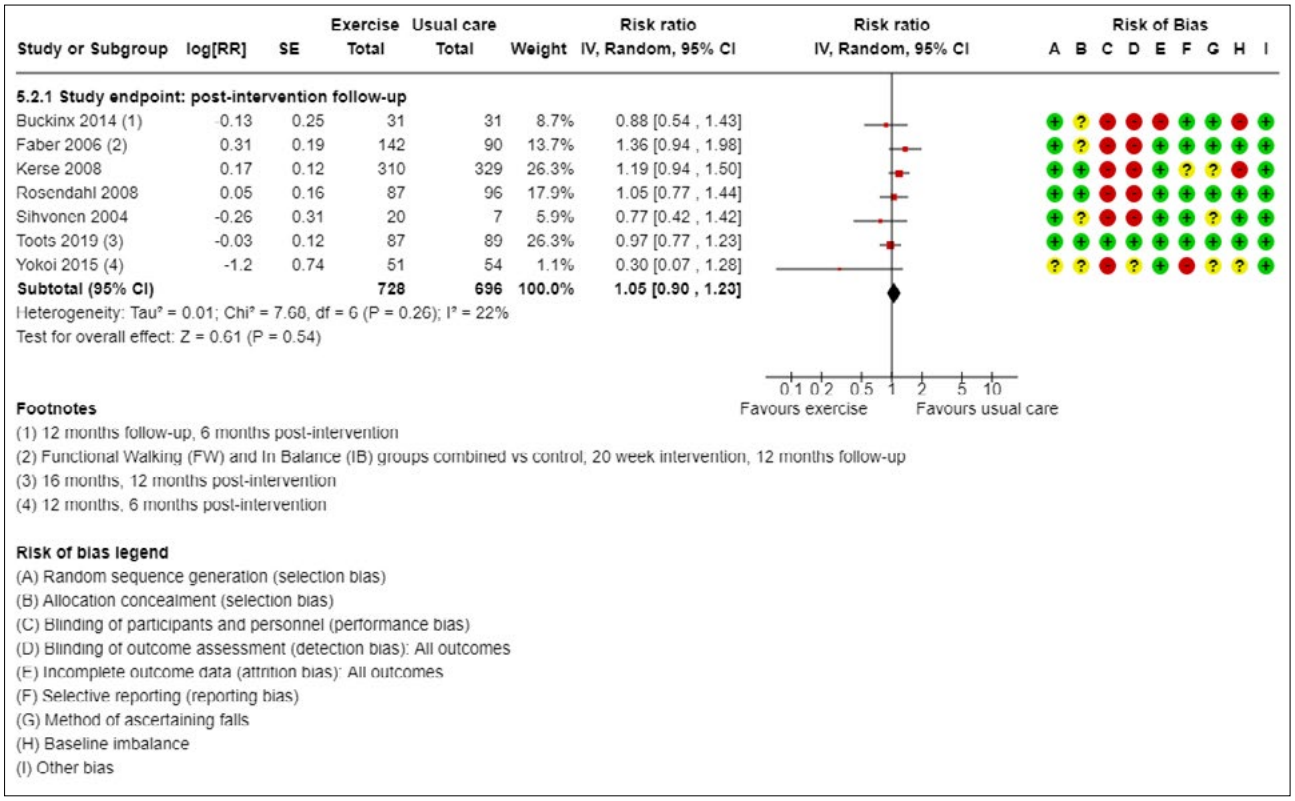
Study or Subgroup	log[RR]	SE	Exercise Total	Usual care Total	Weight	Risk ratio IV, Random, 95% CI
4.2.1 Study endpoint: End of intervention						
Brett 2021	-0.734	0.301	36	19	6.6%	0.48 [0.27 , 0.87]
Buckinx 2014 (1)	0	0.4	31	31	4.0%	1.00 [0.46 , 2.19]
Choi 2005	-0.51	0.58	29	30	2.0%	0.60 [0.19 , 1.87]
Dhargave 2020	-0.329	0.311	75	77	6.2%	0.72 [0.39 , 1.32]
Hewitt 2018 (2)	-0.416	0.174	113	108	14.7%	0.66 [0.47 , 0.93]
Kovacs 2013	-0.4	0.31	32	30	6.3%	0.67 [0.37 , 1.23]
Mulrow 1994	0.15	0.17	97	97	15.1%	1.16 [0.83 , 1.62]
Rosendahl 2008	-0.02	0.18	87	96	14.1%	0.98 [0.69 , 1.39]
Sakamoto 2006	-0.11	0.16	315	212	16.2%	0.90 [0.65 , 1.23]
Toots 2019 (3)	-0.062	0.161	93	93	14.0%	0.94 [0.66 , 1.34]
Yokoi 2015	-1.56	1.02	51	54	0.7%	0.21 [0.03 , 1.55]
Subtotal (95% CI)			**959**	**847**	**100.0%**	**0.83 [0.71 , 0.98]**

Heterogeneity: Tau² = 0.02; Chi² = 13.42, df = 10 (P = 0.20); I² = 26%
Test for overall effect: Z = 2.15 (P = 0.03)

Footnotes
(1) 6 months (end of intervention)
(2) Includes 6 months post-intervention maintenance
(3) 4 months

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

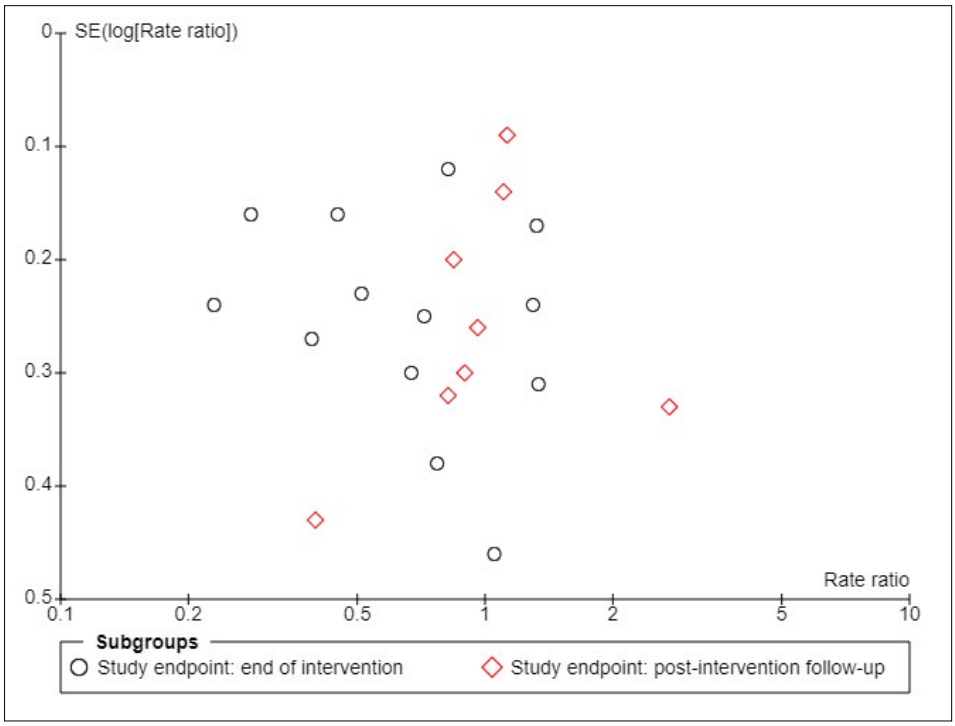
Appendices

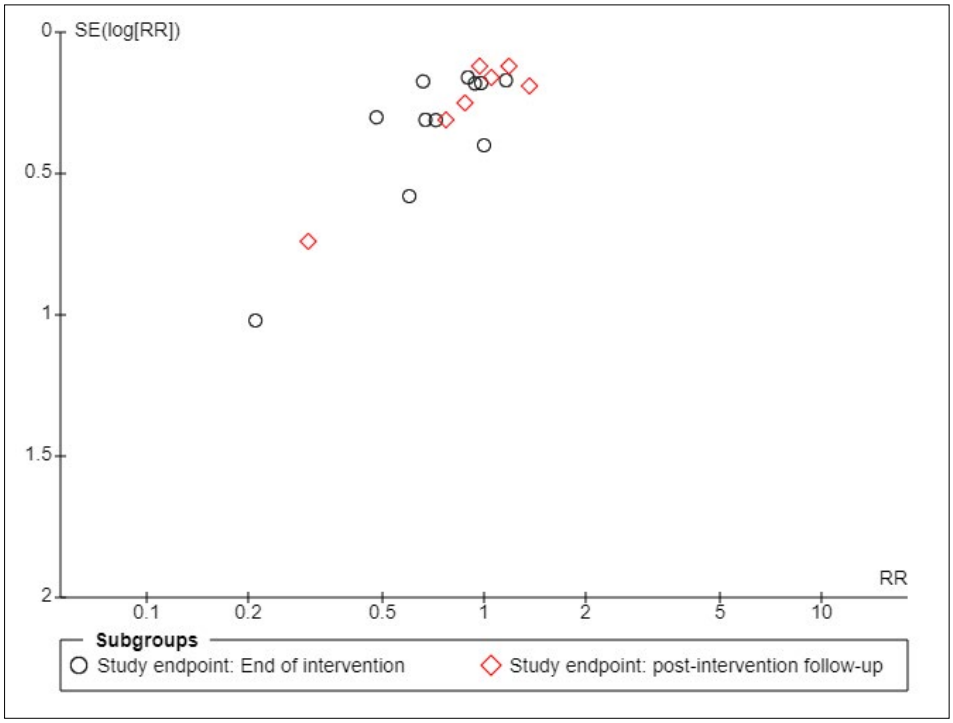


Sensitivity analysis: End of intervention 7 studies, 0.79 (0.65, 0.96), post-intervention follow-up 5 studies 1.02 (0.81, 1.27)

Appendices

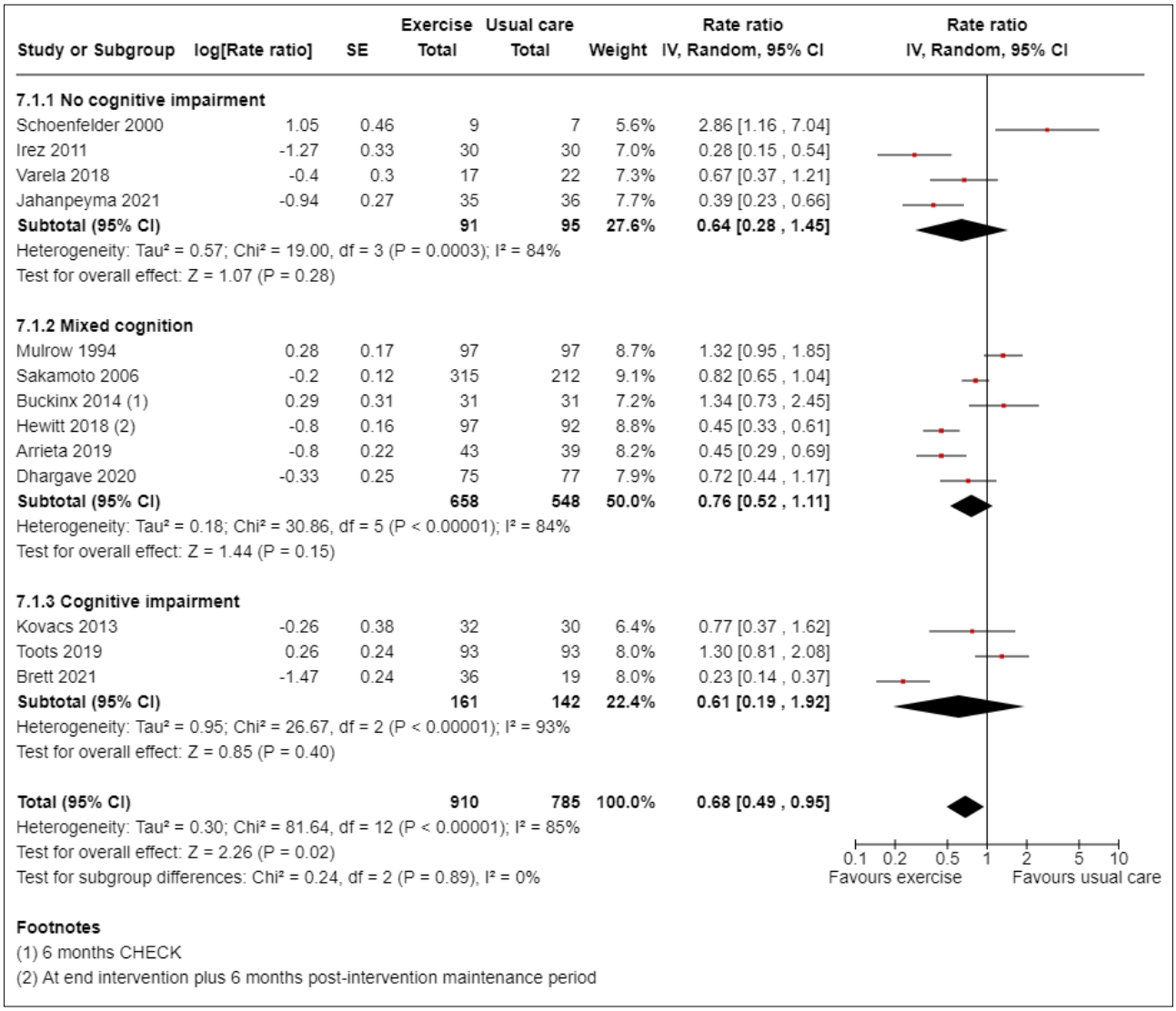
Funnel plots:





Subgroup analysis by cognitive status at the end of the intervention period

Appendices



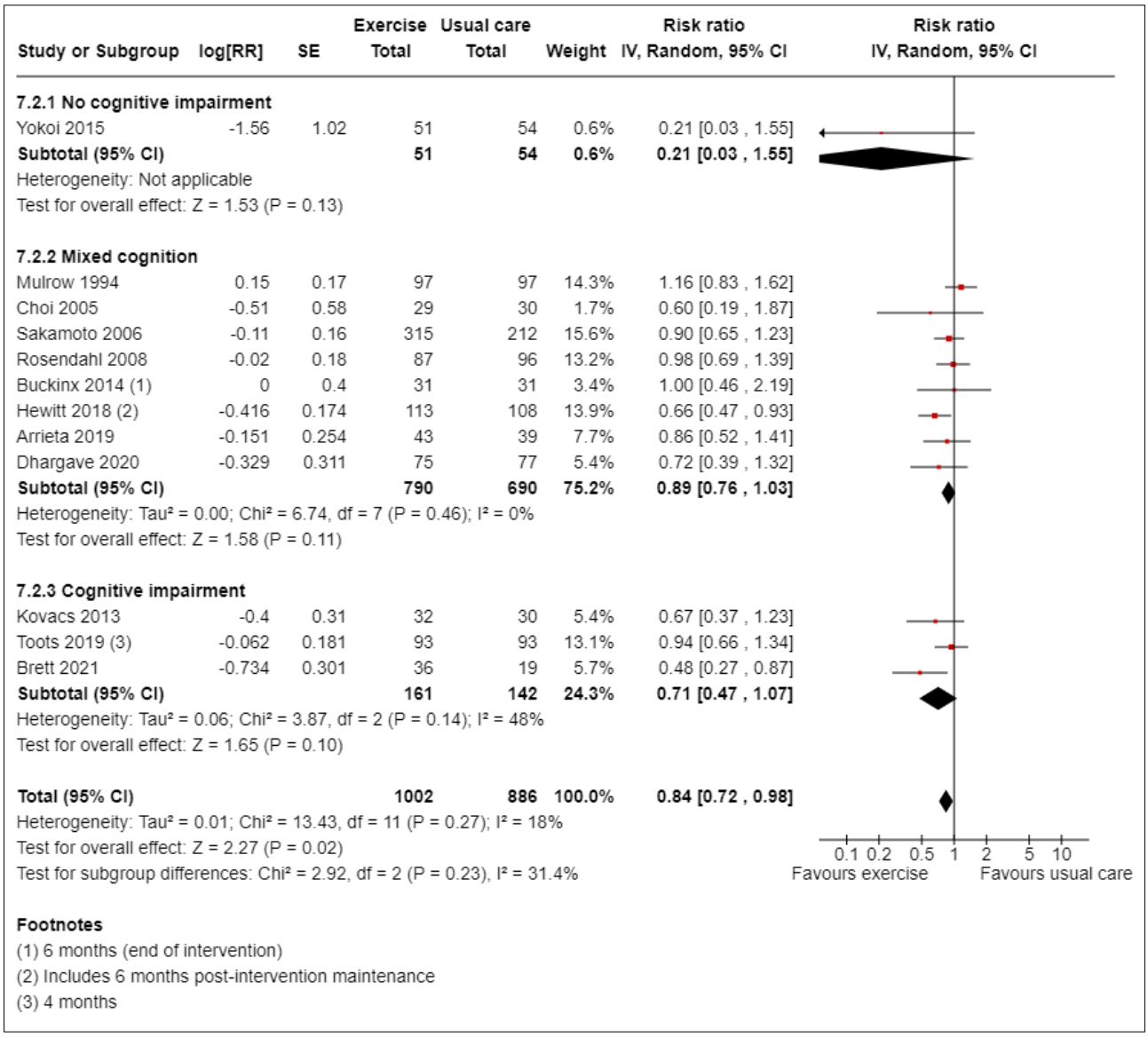
Study or Subgroup	log[Rate ratio]	SE	Exercise Total	Usual care Total	Weight	Rate ratio IV, Random, 95% CI
7.1.1 No cognitive impairment						
Schoenfelder 2000	1.05	0.46	9	7	5.6%	2.86 [1.16 , 7.04]
Irez 2011	-1.27	0.33	30	30	7.0%	0.28 [0.15 , 0.54]
Varela 2018	-0.4	0.3	17	22	7.3%	0.67 [0.37 , 1.21]
Jahanpeyma 2021	-0.94	0.27	35	36	7.7%	0.39 [0.23 , 0.66]
Subtotal (95% CI)			**91**	**95**	**27.6%**	**0.64 [0.28 , 1.45]**
Heterogeneity: Tau² = 0.57; Chi² = 19.00, df = 3 (P = 0.0003); I² = 84%						
Test for overall effect: Z = 1.07 (P = 0.28)						
7.1.2 Mixed cognition						
Mulrow 1994	0.28	0.17	97	97	8.7%	1.32 [0.95 , 1.85]
Sakamoto 2006	-0.2	0.12	315	212	9.1%	0.82 [0.65 , 1.04]
Buckinx 2014 (1)	0.29	0.31	31	31	7.2%	1.34 [0.73 , 2.45]
Hewitt 2018 (2)	-0.8	0.16	97	92	8.8%	0.45 [0.33 , 0.61]
Arrieta 2019	-0.8	0.22	43	39	8.2%	0.45 [0.29 , 0.69]
Dhargave 2020	-0.33	0.25	75	77	7.9%	0.72 [0.44 , 1.17]
Subtotal (95% CI)			**658**	**548**	**50.0%**	**0.76 [0.52 , 1.11]**
Heterogeneity: Tau² = 0.18; Chi² = 30.86, df = 5 (P < 0.00001); I² = 84%						
Test for overall effect: Z = 1.44 (P = 0.15)						
7.1.3 Cognitive impairment						
Kovacs 2013	-0.26	0.38	32	30	6.4%	0.77 [0.37 , 1.62]
Toots 2019	0.26	0.24	93	93	8.0%	1.30 [0.81 , 2.08]
Brett 2021	-1.47	0.24	36	19	8.0%	0.23 [0.14 , 0.37]
Subtotal (95% CI)			**161**	**142**	**22.4%**	**0.61 [0.19 , 1.92]**
Heterogeneity: Tau² = 0.95; Chi² = 26.67, df = 2 (P < 0.00001); I² = 93%						
Test for overall effect: Z = 0.85 (P = 0.40)						
Total (95% CI)			**910**	**785**	**100.0%**	**0.68 [0.49 , 0.95]**
Heterogeneity: Tau² = 0.30; Chi² = 81.64, df = 12 (P < 0.00001); I² = 85%						
Test for overall effect: Z = 2.26 (P = 0.02)						
Test for subgroup differences: Chi² = 0.24, df = 2 (P = 0.89), I² = 0%						

Footnotes

(1) 6 months CHECK

(2) At end intervention plus 6 months post-intervention maintenance period

Appendices



Study or Subgroup	log[RR]	SE	Exercise Total	Usual care Total	Weight	Risk ratio IV, Random, 95% CI
7.2.1 No cognitive impairment						
Yokoi 2015	-1.56	1.02	51	54	0.6%	0.21 [0.03 , 1.55]
Subtotal (95% CI)			**51**	**54**	**0.6%**	**0.21 [0.03 , 1.55]**
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.53 (P = 0.13)						
7.2.2 Mixed cognition						
Mulrow 1994	0.15	0.17	97	97	14.3%	1.16 [0.83 , 1.62]
Choi 2005	-0.51	0.58	29	30	1.7%	0.60 [0.19 , 1.87]
Sakamoto 2006	-0.11	0.16	315	212	15.6%	0.90 [0.65 , 1.23]
Rosendahl 2008	-0.02	0.18	87	96	13.2%	0.98 [0.69 , 1.39]
Buckinx 2014 (1)	0	0.4	31	31	3.4%	1.00 [0.46 , 2.19]
Hewitt 2018 (2)	-0.416	0.174	113	108	13.9%	0.66 [0.47 , 0.93]
Arrieta 2019	-0.151	0.254	43	39	7.7%	0.86 [0.52 , 1.41]
Dhargave 2020	-0.329	0.311	75	77	5.4%	0.72 [0.39 , 1.32]
Subtotal (95% CI)			**790**	**690**	**75.2%**	**0.89 [0.76 , 1.03]**
Heterogeneity: Tau² = 0.00; Chi² = 6.74, df = 7 (P = 0.46); I² = 0%						
Test for overall effect: Z = 1.58 (P = 0.11)						
7.2.3 Cognitive impairment						
Kovacs 2013	-0.4	0.31	32	30	5.4%	0.67 [0.37 , 1.23]
Toots 2019 (3)	-0.062	0.181	93	93	13.1%	0.94 [0.66 , 1.34]
Brett 2021	-0.734	0.301	36	19	5.7%	0.48 [0.27 , 0.87]
Subtotal (95% CI)			**161**	**142**	**24.3%**	**0.71 [0.47 , 1.07]**
Heterogeneity: Tau² = 0.06; Chi² = 3.87, df = 2 (P = 0.14); I² = 48%						
Test for overall effect: Z = 1.65 (P = 0.10)						
Total (95% CI)			**1002**	**886**	**100.0%**	**0.84 [0.72 , 0.98]**
Heterogeneity: Tau² = 0.01; Chi² = 13.43, df = 11 (P = 0.27); I² = 18%						
Test for overall effect: Z = 2.27 (P = 0.02)						
Test for subgroup differences: Chi² = 2.92, df = 2 (P = 0.23), I² = 31.4%						

Footnotes

(1) 6 months (end of intervention)

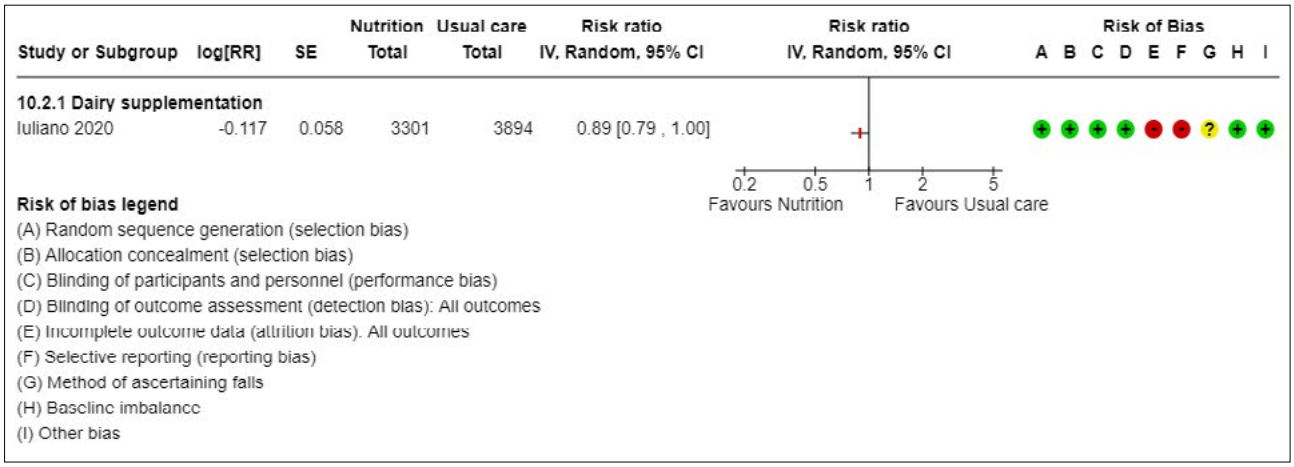
(2) Includes 6 months post-intervention maintenance

(3) 4 months

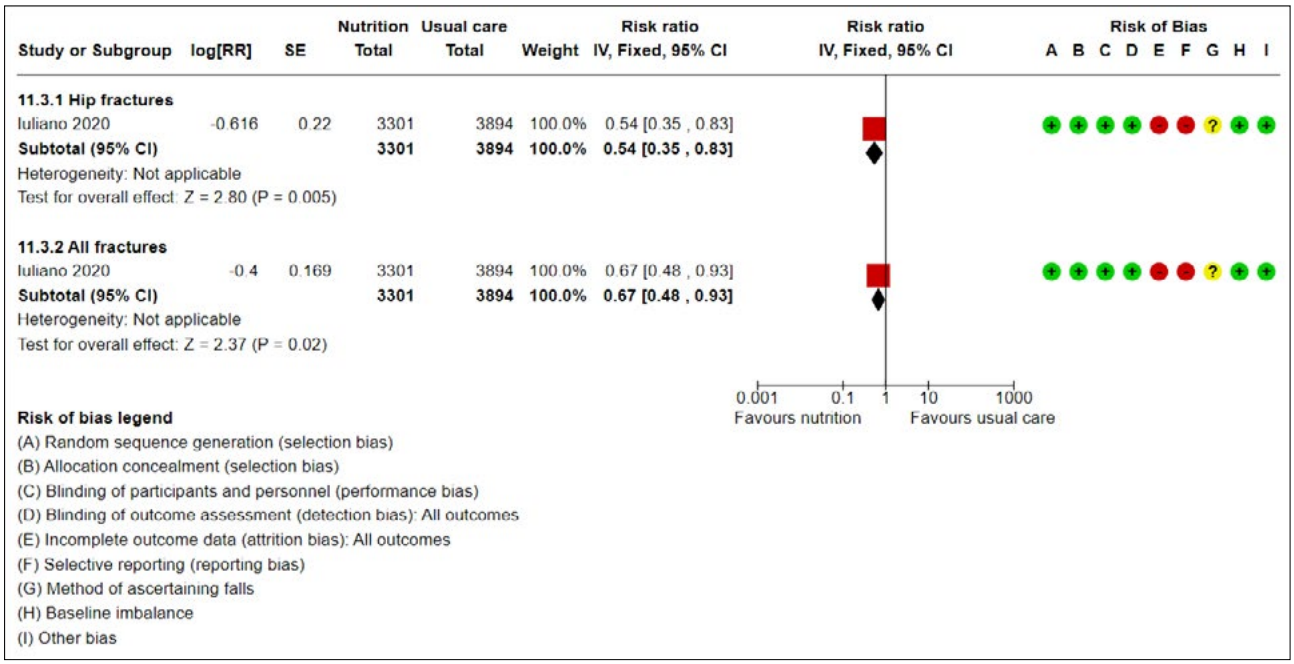
Appendices

Dairy supplementation

Risk of falling:



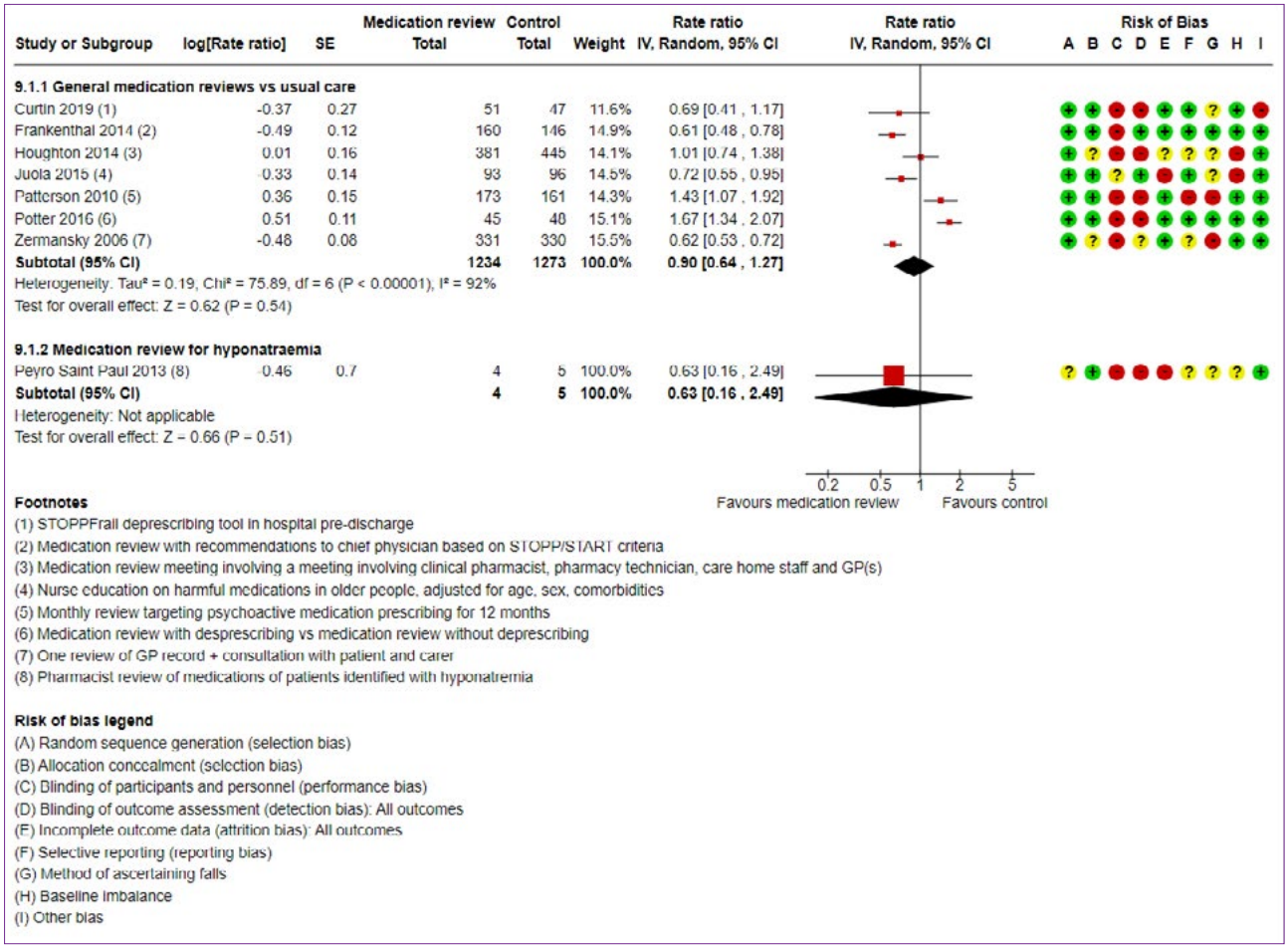
Risk of fracture:



Appendices

Medicines review

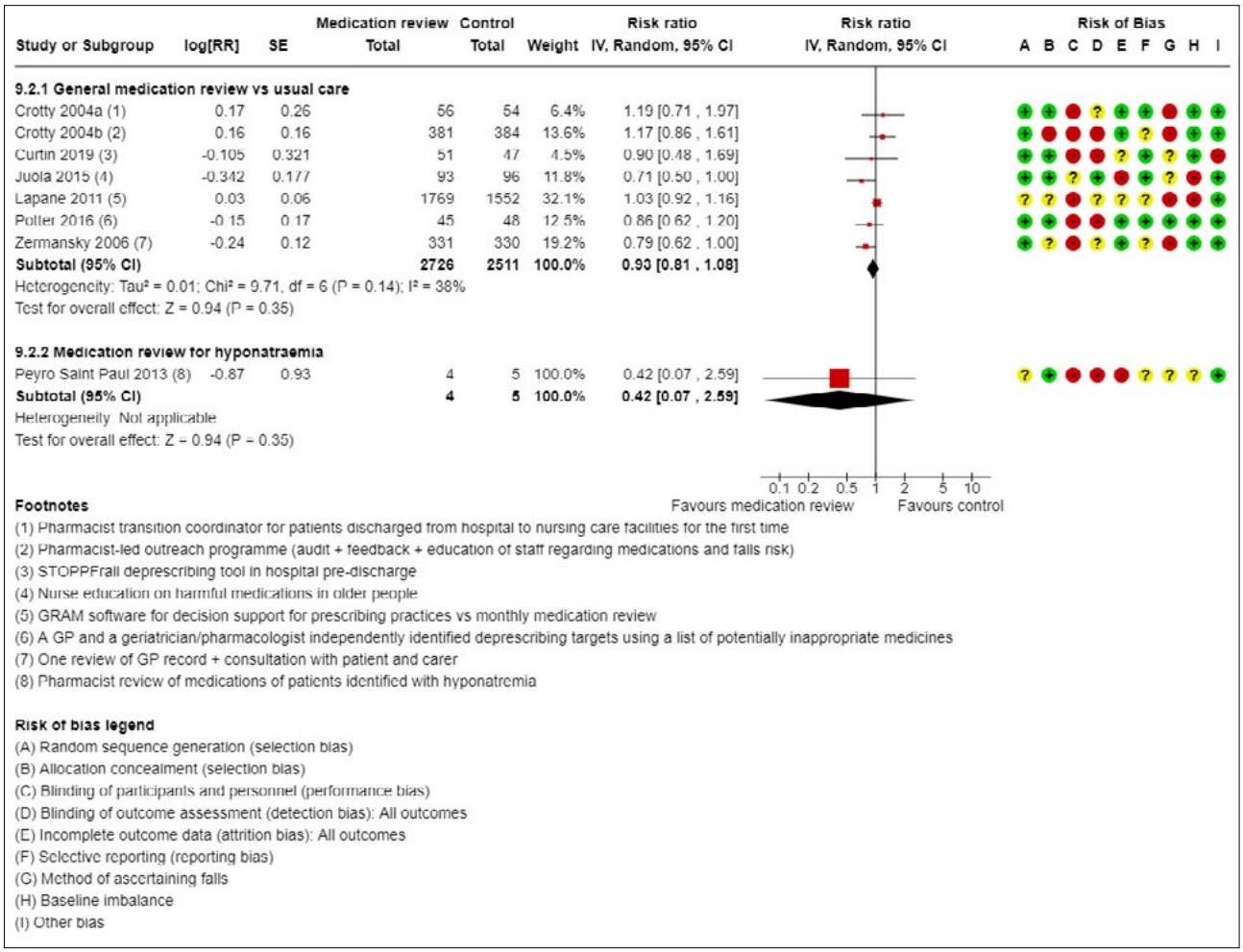
Rate of falls:



Risk of bias sensitivity analyses: RaR 0.90 (0.43, 1.90), 3 trials

Appendices

Risk of falling:



Footnotes

(1) Pharmacist transition coordinator for patients discharged from hospital to nursing care facilities for the first time
(2) Pharmacist-led outreach programme (audit + feedback + education of staff regarding medications and falls risk)
(3) STOPPFrail deprescribing tool in hospital pre-discharge
(4) Nurse education on harmful medications in older people
(5) GRAM software for decision support for prescribing practices vs monthly medication review
(6) A GP and a geriatrician/pharmacologist independently identified deprescribing targets using a list of potentially inappropriate medicines
(7) One review of GP record + consultation with patient and carer
(8) Pharmacist review of medications of patients identified with hyponatremia

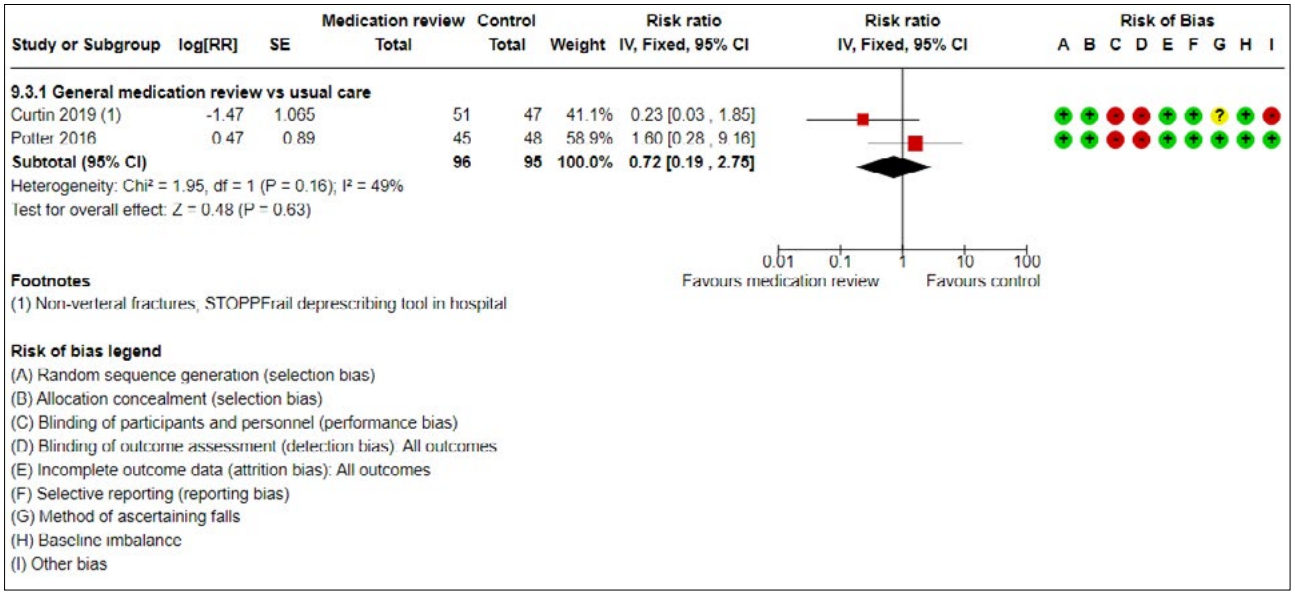
Risk of bias legend

(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 bias sensitivity analyses: RR 0.87 (0.65 – 1.17); 2 trials

Appendices

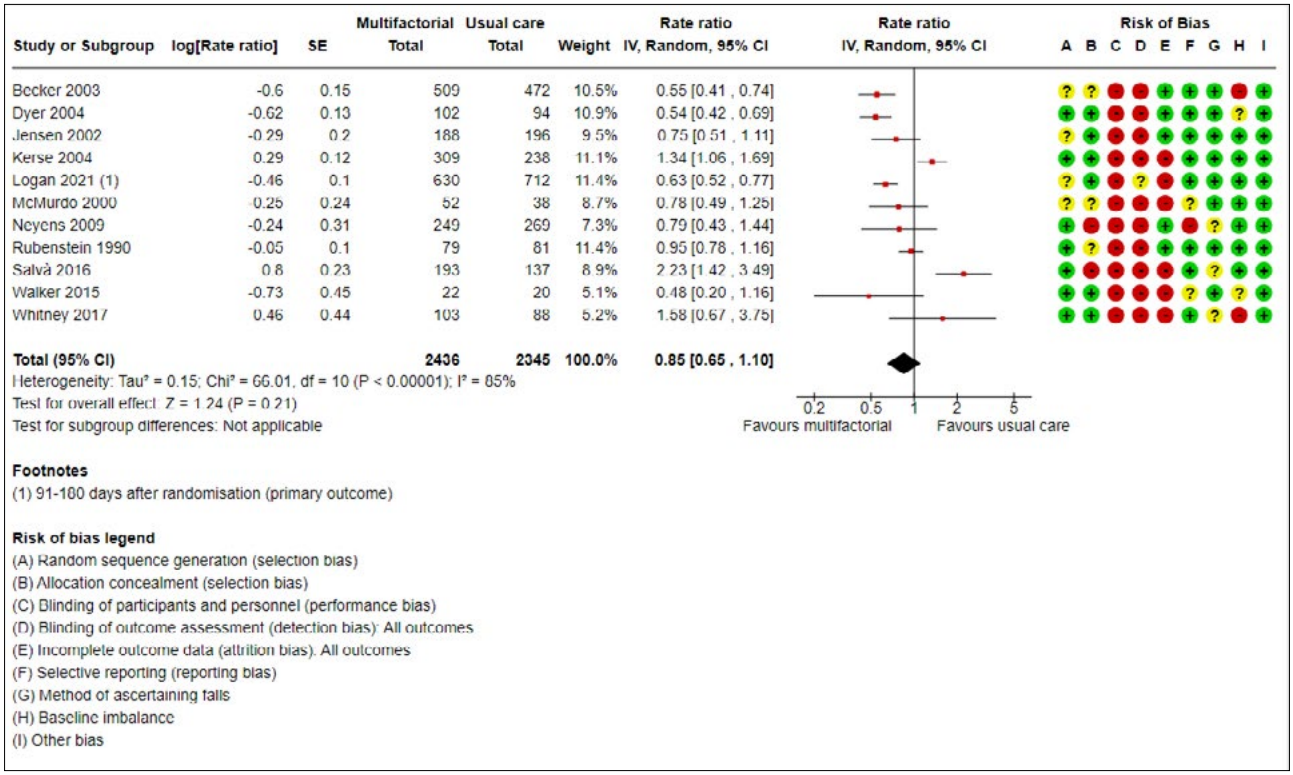
Risk of fracture



Appendices

Multifactorial interventions

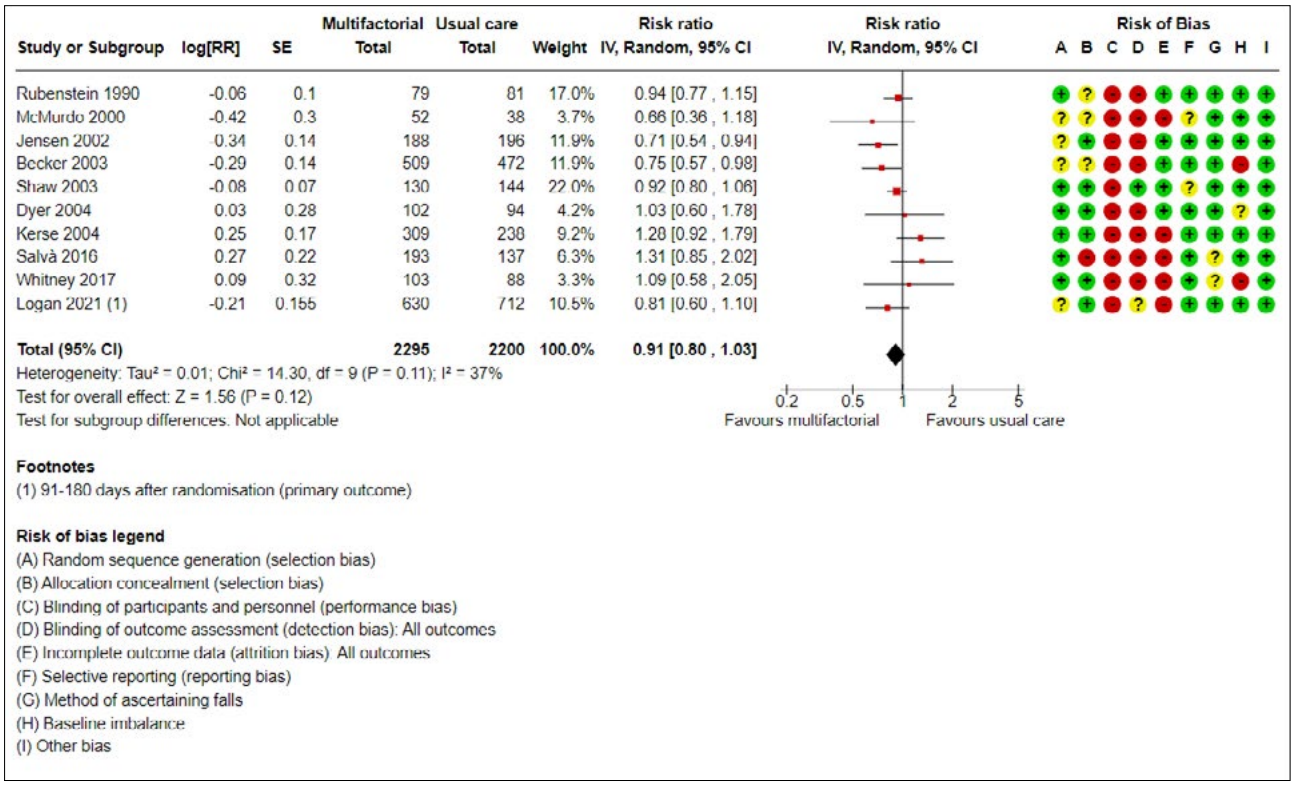
Rate of falls



RoB sensitivity analysis: RaR 0.74 [0.54 , 1.02], P=0.06, I^2 = 75%, 4 trials

Appendices

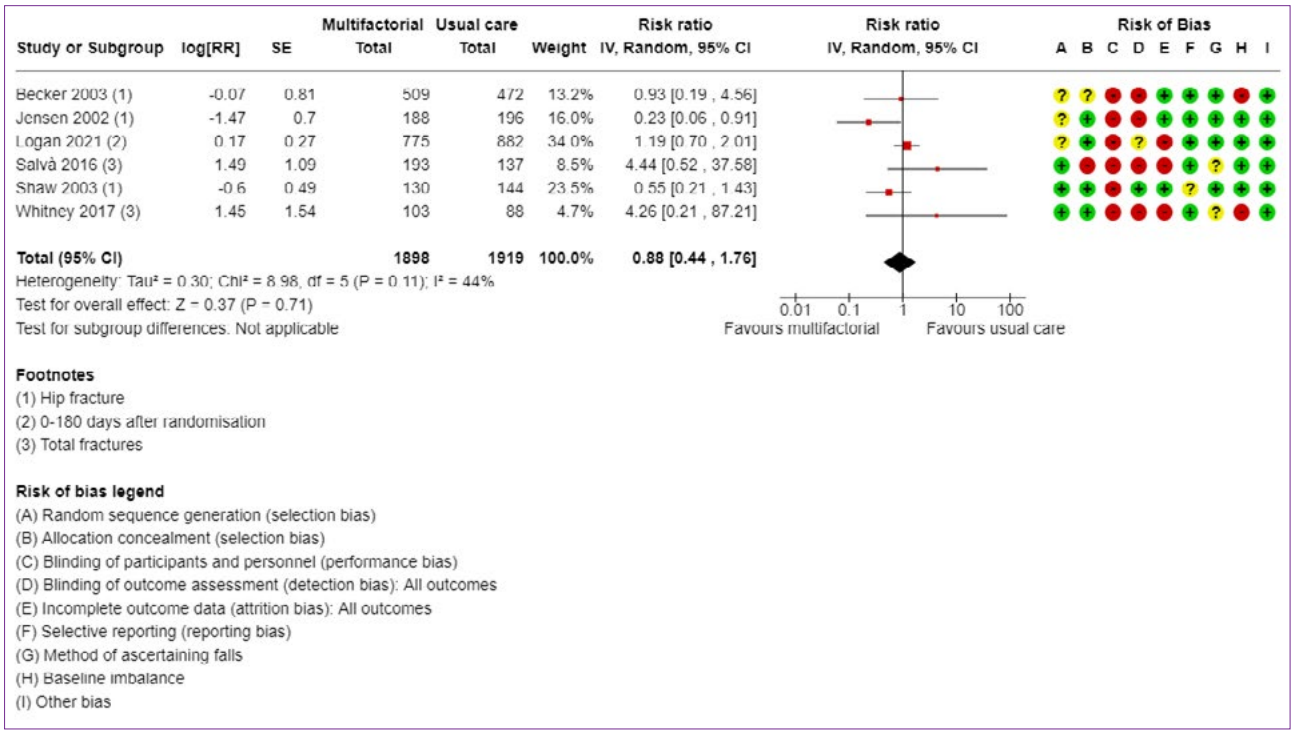
Risk of falling



RoB sensitivity analysis: RR 0.90 [0.80 , 1.00], P=0.06, I^2 = 11%, 3 trials

Appendices

Risk of fracture:



Footnotes

(1) Hip fracture
(2) 0-180 days after randomisation
(3) Total fractures

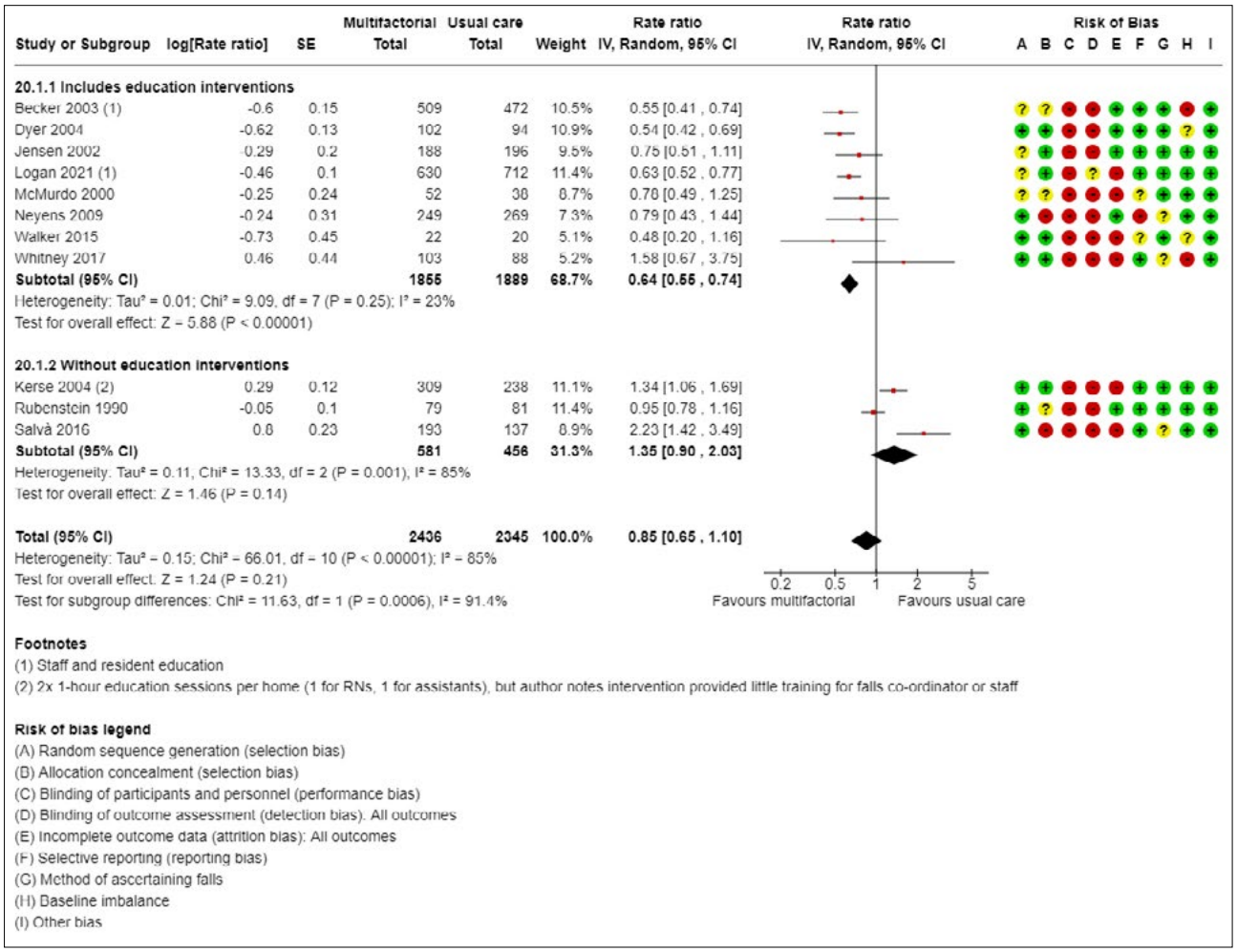
Risk of bias legend

(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

RoB sensitivity analysis: RR 0.79 [0.33, 1.91], P=0.60, I^2 = 62%, 4 trials

Appendices

Subgroup analysis according to education interventions:



Note in the above Kerse 2004 is categorised as not providing education, as whilst the intervention included two 1-hour educational sessions in each RACS (1 for RNs and 1 for assistants), the author noted that there was “little training”.

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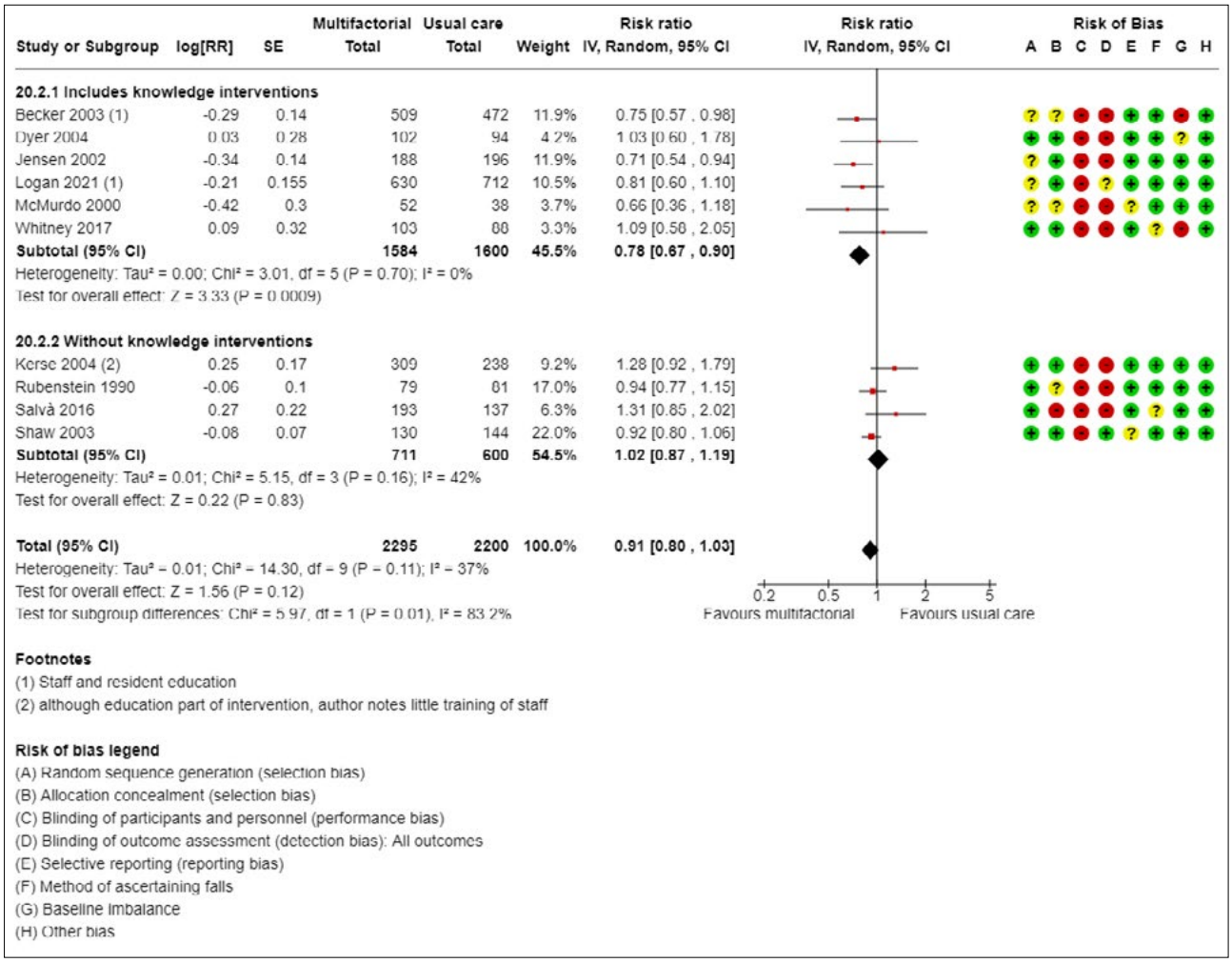


Study or Subgroup	log[RR]	SE	Multifactorial Total	Usual care Total	Weight	Risk ratio IV, Random, 95% CI
20.2.1 Includes knowledge interventions						
Becker 2003 (1)	-0.29	0.14	509	472	11.9%	0.75 [0.57 , 0.98]
Dyer 2004	0.03	0.28	102	94	4.2%	1.03 [0.60 , 1.78]
Jensen 2002	-0.34	0.14	188	196	11.9%	0.71 [0.54 , 0.94]
Logan 2021 (1)	-0.21	0.155	630	712	10.5%	0.81 [0.60 , 1.10]
McMurdo 2000	-0.42	0.3	52	38	3.7%	0.66 [0.36 , 1.18]
Whitney 2017	0.09	0.32	103	88	3.3%	1.09 [0.58 , 2.05]
Subtotal (95% CI)			**1584**	**1600**	**45.5%**	**0.78 [0.67 , 0.90]**
Heterogeneity: Tau² = 0.00; Chi² = 3.01, df = 5 (P = 0.70); I² = 0%						
Test for overall effect: Z = 3.33 (P = 0.0009)						
20.2.2 Without knowledge interventions						
Kerse 2004 (2)	0.25	0.17	309	238	9.2%	1.28 [0.92 , 1.79]
Rubenstein 1990	-0.06	0.1	79	81	17.0%	0.94 [0.77 , 1.15]
Salvà 2016	0.27	0.22	193	137	6.3%	1.31 [0.85 , 2.02]
Shaw 2003	-0.08	0.07	130	144	22.0%	0.92 [0.80 , 1.06]
Subtotal (95% CI)			**711**	**600**	**54.5%**	**1.02 [0.87 , 1.19]**
Heterogeneity: Tau² = 0.01; Chi² = 5.15, df = 3 (P = 0.16); I² = 42%						
Test for overall effect: Z = 0.22 (P = 0.83)						
Total (95% CI)			**2295**	**2200**	**100.0%**	**0.91 [0.80 , 1.03]**
Heterogeneity: Tau² = 0.01; Chi² = 14.30, df = 9 (P = 0.11); I² = 37%						
Test for overall effect: Z = 1.56 (P = 0.12)						
Test for subgroup differences: Chi² = 5.97, df = 1 (P = 0.01), I² = 83.2%						

Footnotes

(1) Staff and resident education

(2) although education part of intervention, author notes little training of staff

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) Selective reporting (reporting bias)

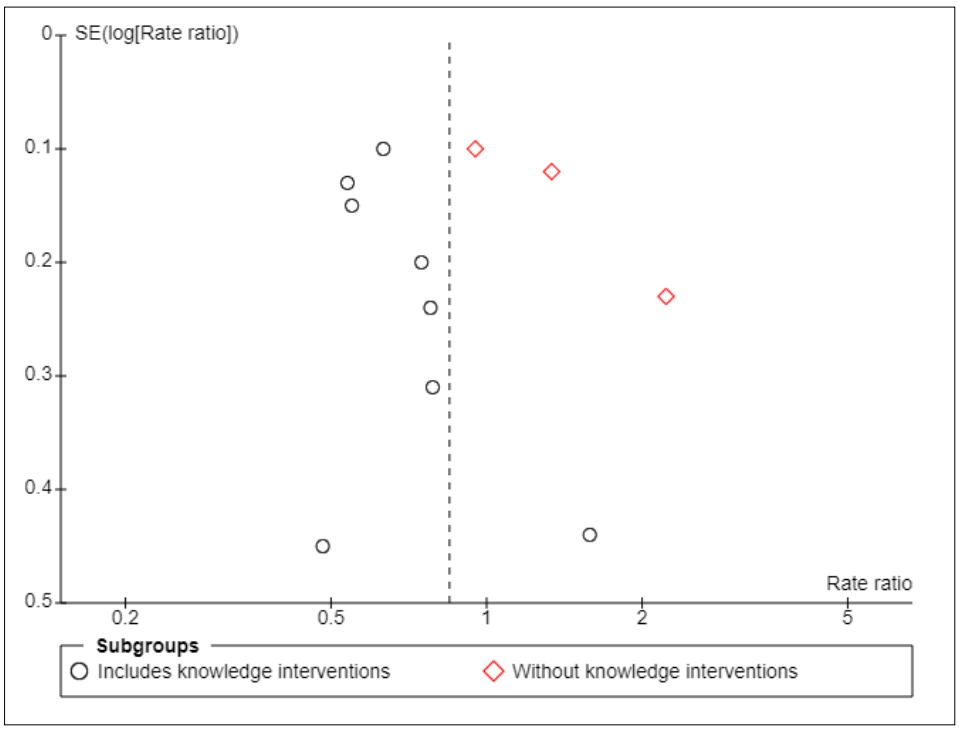
(F) Method of ascertaining falls

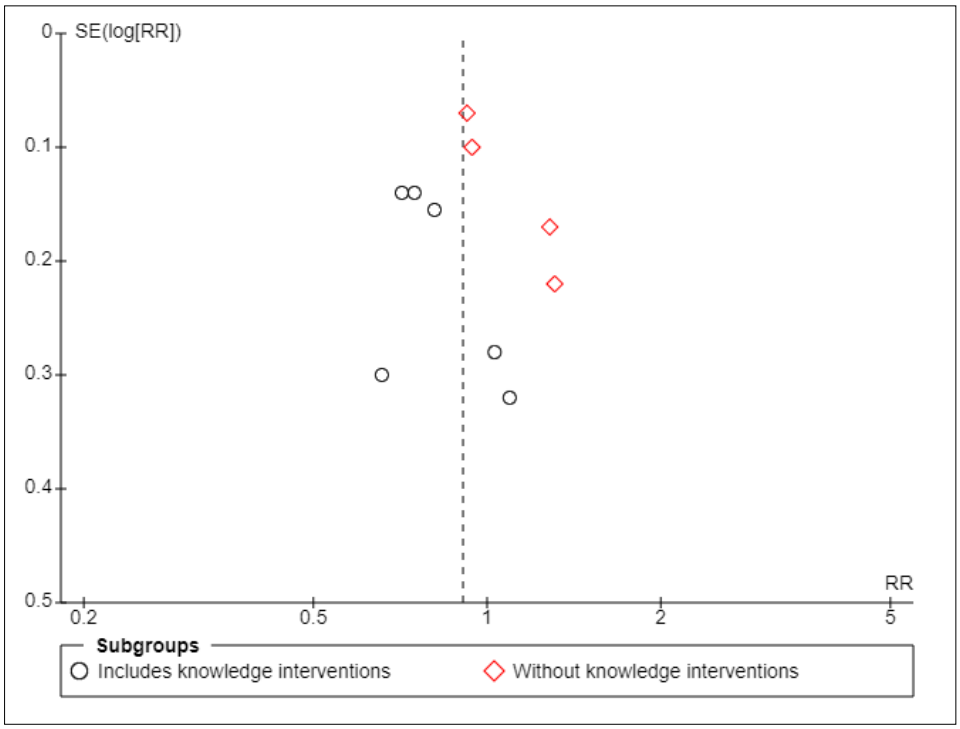
(G) Baseline imbalance

(H) Other bias

Appendices

Funnel plots:

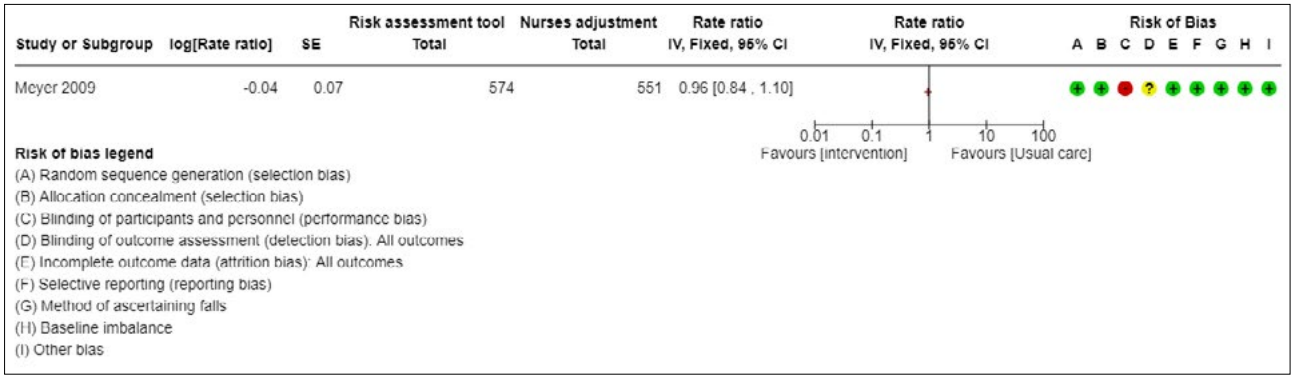




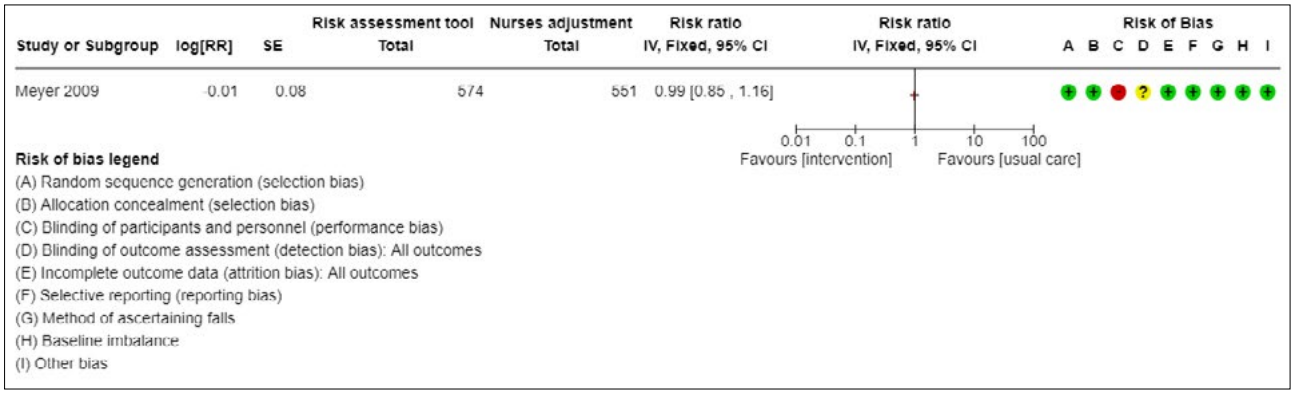
Appendices

Fall risk assessment

Rate of falls



Risk of falling

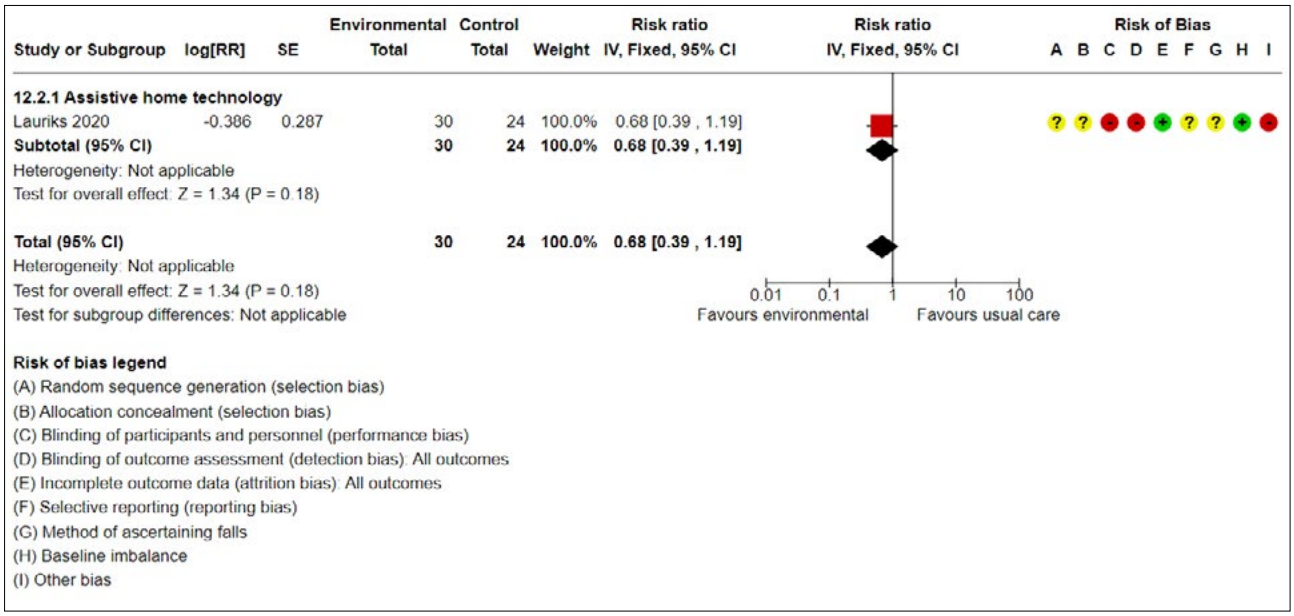


Appendices

New trials not significantly reducing falls

Environmental interventions – assistive home technology

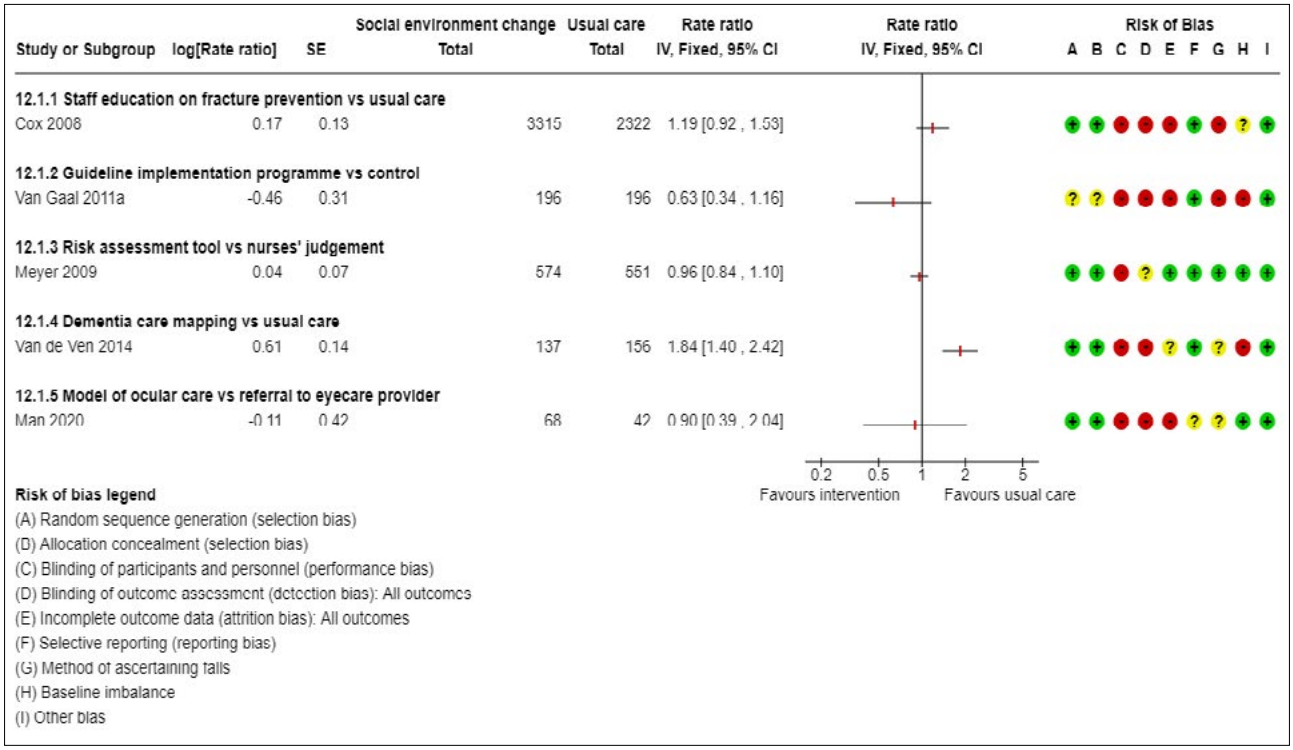
- Rate of falls analysis unchanged (no new trials)
- Risk of falling:



Appendices

Social environment

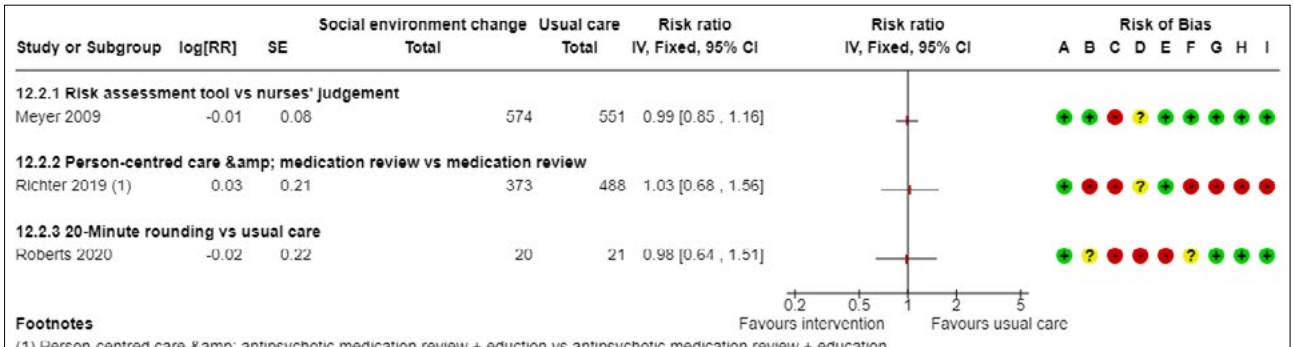
Rate of falls - new trial is model of ocular care



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

Risk of falling – includes new trials of person-centred care & 20-minute rounding



Footnotes

(1) Person-centred care & antipsychotic medication review + eduction vs antipsychotic medication review + 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
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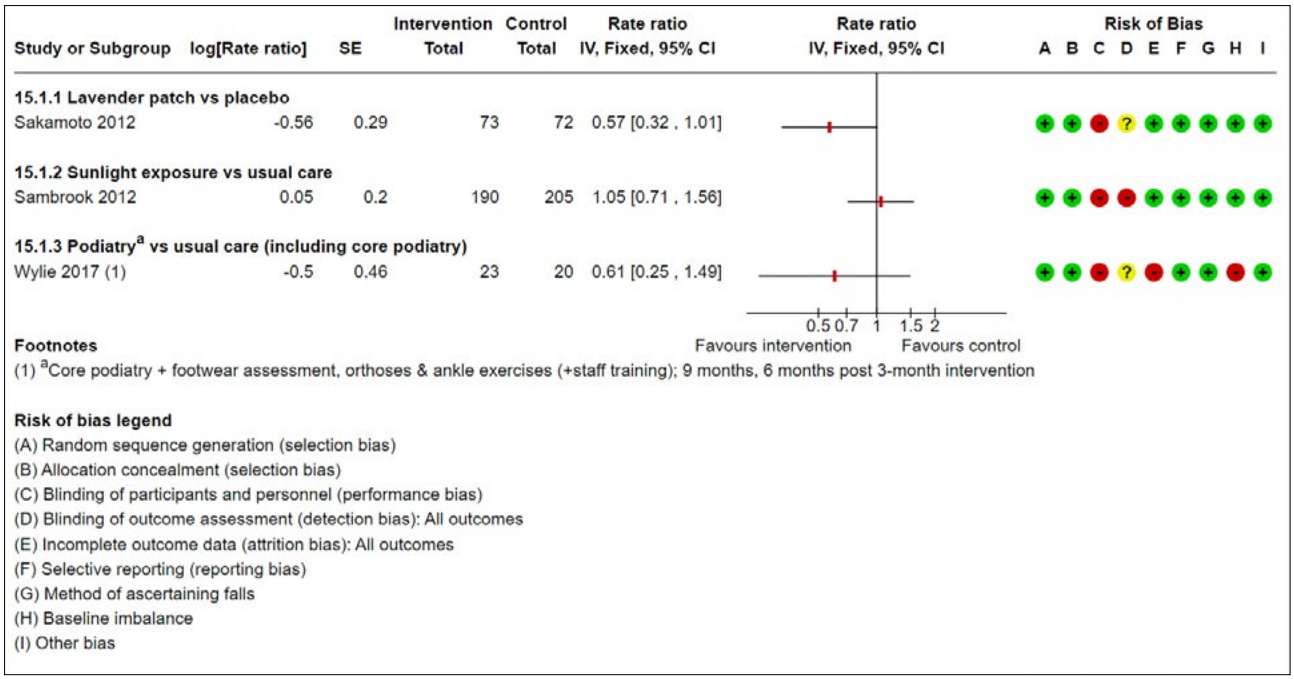
Multifaceted podiatry intervention



Footnotes

(1) [a]Core podiatry + footwear assessment, orthoses & ankle exercises (+staff training); 9 months, 6 months post 3-month intervention

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
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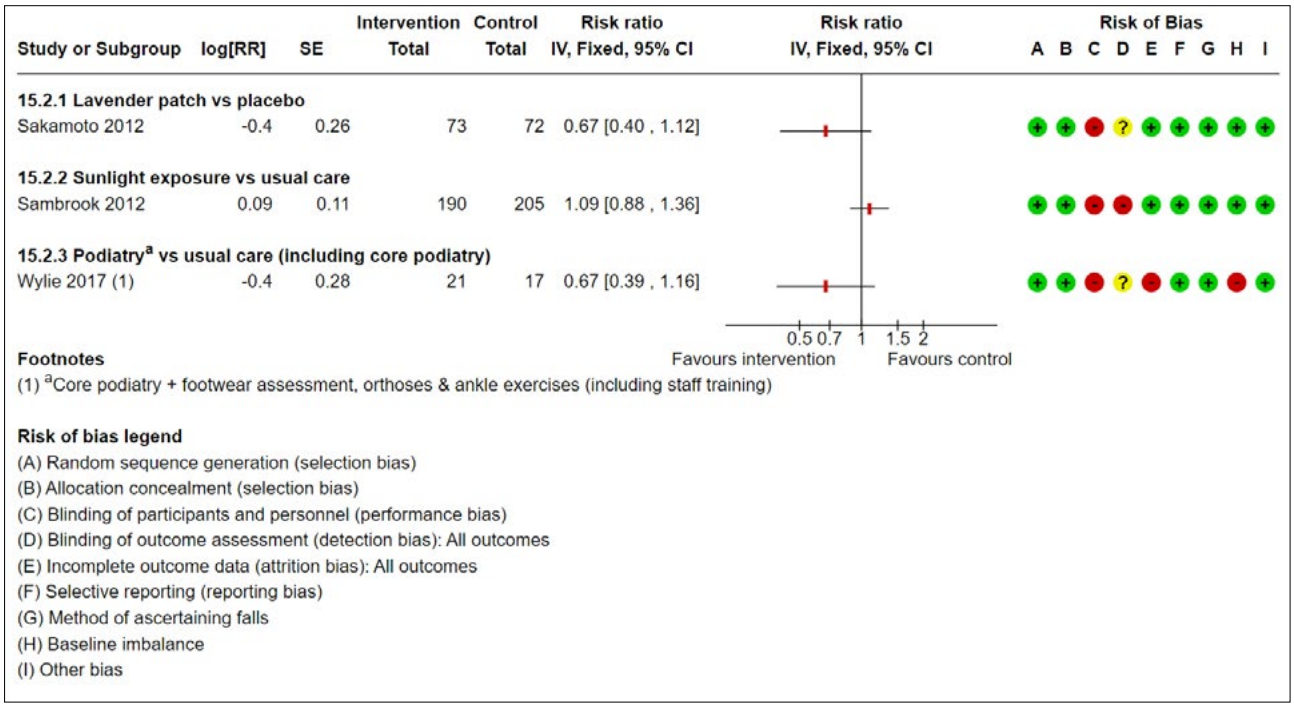

Footnotes

(1) [a]Core podiatry + footwear assessment, orthoses & ankle exercises (including staff training)

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
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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.

Culturally safe: Culturally safe care and services are planned and delivered in a way that is spiritually, socially, emotionally and physically safe and respectful for older people. Culturally safe care and services ensure that an older person's identity is respected so that who they are and what they need is not questioned or denied. Whether care and services are 'culturally safe' can only be determined by those receiving care.

For Aboriginal and Torres Strait Islander peoples, culturally safe practice is the ongoing critical reflection on provider knowledge, skills, attitudes, practising behaviours and power differentials in delivering safe, accessible and responsive care and services free of racism.

Delirium: An acute change in cognitive function characterised by fluctuating confusion, impaired concentration and attention.

Dementia: Impairment in more than one cognitive domain that affects 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.

Facility: Used to refer to hospitals.

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 task force 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.

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.

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 Residential Aged Care Facilities 2009.

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.

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 as a falls-related injury, particularly as falls are the leading cause of traumatic brain injuries 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.

Glossary

Multifactorial interventions: Where people receive multiple interventions, and the combination of these interventions is tailored to the person based on an individual assessment.

Multiple interventions: Where everyone receives the same, fixed combination of interventions.

National Aged Care Mandatory Quality Indicator Program: collects quality indicator data from RACS on quality indicators across critical areas of care that can affect the health and wellbeing of older people, including falls and falls with major injury.

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 medicines have on the body.

Pharmacokinetics: The study of the way in which the body handles medicines, including the processes of absorption, distribution, excretion and localisation in tissues and chemical breakdown.

Psychotropic medicines: A medicine that affects the mental state. Psychotropic medicines include antidepressants, anticonvulsants, antipsychotics, mood stabilisers, anxiolytics, hypnotics, antiparkinsonian medicines, psychostimulants and dementia medicines.

Reablement: Reablement is a strategy to help people improve their independence and confidence by learning or re-learning, regaining or maintaining functions, and increasing motivation and autonomy.

Reasonable adjustments: A reasonable adjustment is a change to an existing approach or process that is essential to ensure a person's access to a service. Making reasonable adjustments for a person's disability creates an inclusive environment and facilitates meeting the National Safety and Quality Health Service Standards.

Residential aged care services (RACS): Refers to a commonwealth-funded residential service.

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: 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.

Strengthened Aged Care Quality Standards: The strengthened Aged Care Quality Standards set out requirements for government-funded aged care providers to ensure they deliver quality care that is safe and meets the needs and preferences of older people. These will be implemented under the new Aged Care Act.

Syncope: A temporary loss of consciousness with spontaneous recovery, which occurs when there is a transient decrease in cerebral blood flow.

Trauma-aware and healing-informed care: recognises that a number of people have experienced trauma in their lives and considers how this may affect them when providing care. Trauma-informed and healing approaches must be used to restore wellbeing and enable people to self-manage and control their care decisions.

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.

Glossary

Workforce: People working in an organisation who are responsible for its maintenance or administration, or the care and services, support of, or involvement with, older people. A member of the workforce is anyone the organisation employs, hires, retains or contracts (directly or through an employment or recruitment agency) to provide maintenance and administration or care and services under the control of the organisation. It also includes volunteers who provide care and services for the organisation.

For clarity, people in an organisation's workforce include:

- employees and contractors (this includes all workers employed, hired, retained or contracted to provide services under the control of the organisation)
- allied health professionals the organisation contracts
- kitchen, cleaning, laundry, garden and office staff the organisation employs either directly or under contract

Z-drugs: A class of non-benzodiazepine hypnotics used for insomnia; for example, zolpidem and zopiclone.

Acronyms and abbreviations

Acronym	Meaning
25(O)HD	25-hydroxyvitamin D
ADL	Activities of daily living
BMD	Bone mineral density
BPPV	Benign paroxysmal positional vertigo
BSP	Behaviour support plan
CaHFRiS	Care Home Falls Screen
DEMMI	De Morton Mobility Index
DXA	Dual Energy X-Ray
FORTA	Fit fOR the Aged
FRAX	Fracture Risk Assessment Tool
GP	General Practitioner
IRR	Incidence Rate Ratio
MMSE	Mini Mental State Examination
MoCA	Montreal Cognitive Assessment
25(OH)D	Hydroxyvitamin D
PAS	Psychogeriatric Assessment Scales
PBS	Pharmaceutical Benefits Scheme
PH-FRAT	Peninsula Health Falls Risk Assessment Tool
POMA	Tinetti Performance-Oriented Mobility Assessment Tool
ProFaNE	Prevention of Falls Network Europe
RACS	Residential aged care service
RCT	Randomised controlled trials
RDI	Recommended dietary intake
RMMR	Residential medication management review
RUDAS	Rowland Universal Dementia Scale
SARRAH	Services for Australian Rural and Remote Allied Health
SERM	Selective oestrogen receptor modulators
SNRI	Serotonin and noradrenaline reuptake inhibitors
SSRI	Selective serotonin reuptake inhibitors
TCA	Tricyclic antidepressants
TUG	Timed Up and Go Test
VR	Vestibular rehabilitation

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