Guidebook for Preventing Falls and Harm From Falls in Older People: Australian Hospitals

A Short Version of Preventing Falls and Harm From Falls in Older People: Best Practice Guidelines for Australian Hospitals

2009

AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

ACSQHC was established in January 2006 by the Australian health ministers to lead and coordinate improvements in safety and quality in Australian health care.

Copies of this document and further information on the work of ACSQHC can be found at http://www.safetyandquality.gov.au or obtained from the Office of the Australian Commission on Safety and Quality in Health Care on telephone +61 2 9263 3633 or email to mail@safetyandquality.gov.au.

Acknowledgments

ACSQHC acknowledges the authors, reviewers and editors who undertook the work of reviewing, restructuring and writing the Falls Guidelines and guidebooks. ACSQHC acknowledges the significant contribution of the Falls Guidelines Review Expert Advisory Group for their time and expertise in the development of the Falls Guidelines 2009.

ACSQHC also acknowledges the contributions of many health professionals who participated in focus groups, and provided comment and other support to the project. In particular, the National Injury Prevention Working Group, a network of jurisdictional policy staff, played a significant role in communicating the review to their networks and providing advice.

The guidelines build on earlier work by the former Australian Council for Safety and Quality in Health Care and by Queensland Health.

The contributions of the national and international external quality reviewers and the Office of the Australian Commission on Safety and Quality in Health Care are also acknowledged.

Guidebook for Preventing Falls and Harm From Falls in Older People: Australian Hospitals

A short version of *Preventing Falls and Harm From Falls in Older People: Best Practice Guidelines for Australian Hospitals 2009*

The Australian Commission on Safety and Quality in Health Care (ACSQHC) has developed three separate falls prevention guidelines, with the help of older Australians, for older Australians:

- *Preventing Falls and Harm From Falls: Best Practice Guidelines for Australian Hospitals 2009*
- *Preventing Falls and Harm From Falls: Best Practice Guidelines for Australian Residential Aged Care Facilities 2009*
- *Preventing Falls and Harm From Falls: Best Practice Guidelines for Australian Community Care 2009*.

Collectively, the guidelines are referred to as the Falls Guidelines.

The Falls Guidelines are based on current and relevant literature. They identify principles of care and special considerations for culturally and linguistically diverse, Indigenous, and rural and remote groups. The Falls Guidelines use evidence based recommendations, good practice points, case studies and points of interest to facilitate understanding and promote implementation.

There is a need for further research to establish the effects of interventions on falls rates. Therefore, the Falls Guidelines recognise that sound clinical judgment of informed professionals is best practice in situations where strong recommendations have not been made.

This abridged version of *Preventing Falls and Harm From Falls: Best Practice Guidelines for Australian Hospitals 2009* is designed as a quick reference tool, to guide clinical practice and to help hospitals to develop and implement practices to prevent falls and injuries from falls. The full guidelines for Australian hospitals is a more comprehensive resource and should be referred to when implementing a falls prevention program.

Support resources

Other resources available from http://www.safetyandquality.gov.au:

- *Preventing Falls and Harm From Falls in Older People: Best Practice Guidelines for Australian Community Care 2009*
- *Guidebook for Preventing Falls and Harm From Falls in Older People: Australian Community Care*
- *Preventing Falls and Harm From Falls in Older People: Best Practice Guidelines for Australian Residential Aged Care Facilities 2009*
- *Guidebook for Preventing Falls and Harm From Falls in Older People: Australian Residential Aged Care Facilities*
- *Implementation Guide for Preventing Falls and Harm From Falls in Older People: Best Practice Guidelines for Australian Hospitals and Residential Aged Care Facilities 2009*
- Fact sheets:
  - Falls facts for patients and carers
  - Falls facts for doctors
  - Falls facts for nurses
  - Falls facts for allied health professionals
  - Falls facts for support staff (cleaners, food services and transport staff)
  - Falls facts for health managers.

Contents

Acronyms and abbreviations

ACSQHC	Australian Commission on Safety and Quality in Health Care
BPPV	benign paroxysmal positional vertigo
FRAT	Falls Risk Assessment Tool
FRHOP	Falls Risk for Hospitalised Older People
NARI	National Ageing Research Institute
PJC-FRAT	Peter James Centre Fall Risk Assessment Tool
POMA	Performance-Oriented Mobility Assessment Tool
PPA	Physiological Profile Assessment
PROFET	Prevention of Falls in the Elderly Trial
STRATIFY	St Thomas Risk Assessment Tool in Falling Elderly In-patients
VR	vestibular rehabilitation

1 Background

Key messages of the guidelines

- Many falls can be prevented.
- Fall and injury prevention need to be addressed at both point of care and from a multidisciplinary perspective.
- Managing many of the risk factors for falls (eg delirium or balance problems) will have wider benefits beyond falls prevention.
- Engaging older people is an integral part of preventing falls and minimising harm from falls.
- Best practice in fall and injury prevention includes implementing standard falls prevention strategies, identifying fall risk, and implementing targeted individualised strategies that are resourced adequately, and monitored and reviewed regularly.
- The consequences of falls resulting in minor or no injury are often neglected, but factors such as fear of falling and reduced activity level can profoundly affect function and quality of life, and increase the risk of seriously harmful falls.
- The most effective approach to falls prevention is likely to be one that includes all staff in health care facilities engaged in a multifactorial falls prevention program.
- At a strategic level, there will be a time lag between investment in a falls prevention program and improvements in outcome measures.

1.1 What is a fall?

The World Health Organization defines a *fall* as 'an event which results in a person coming to rest inadvertently on the ground or floor or other lower level'.†

An *injurious fall* is a fall that causes a fracture to the limbs, hip or shoulders, or one that causes a traumatic brain injury.

† http://www.who.int/violence_injury_prevention/other_injury/falls/links/en/index.html

1.2 What is an intervention?

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 medication, surgery, early detection (screening), dietary supplements, education or minimisation of risk factors.

In falls prevention, interventions can be:

- targeted at single risk factors — *single interventions*
- targeted at multiple risk factors
  - *multiple interventions* — where everyone receives the same, fixed combination of interventions
  - *multifactorial interventions* — where people receive multiple interventions, but the combination of these interventions is tailored to the individual, based on an individual assessment.

1.3 Development of the Falls Guidelines

The Falls Guidelines were developed by a multidisciplinary expert panel (the Falls Guidelines Review Expert Advisory Group). Whenever necessary, the expert panel accessed resources outside its membership. An additional external quality reviewer was appointed to review the guidelines from an Australian perspective.

The Falls Guidelines also drew on the following sources of information:

- the previous version of the guidelines
- a search of the most recent literature for each risk factor or intervention
- the most recent Cochrane review of falls prevention interventions in the hospital setting
- feedback from health professionals and policy staff implementing the previous guidelines
- clinical advice from the expert advisory group
- guidance from external expert reviewers
- guidance from international external expert reviewers
- guidance from specialist groups (such as the Royal Australian College of General Practitioners, Australian Association of Gerontology, and Continence Foundation Australia).

1.3.1 Levels of evidence

Papers that were retrieved from the literature review were classified using the National Health and Medical Research Council's six-point rating system. This system identifies the strength of evidence based on the specific methods used in the paper.

Table 1.1 National Health and Medical Research Council levels of evidence

Level	Description
I	Evidence obtained from a systematic review of all relevant randomised controlled trials
II	Evidence obtained from at least one properly designed randomised controlled trial
III-1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method)
III-2	Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies, or interrupted time series with a control group
III-3	Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group
IV	Evidence obtained from case series, either post-test, or pre-test and post-test

Source: NHMRC[1]

Evidence based recommendations

- Evidence based recommendations are presented in boxes at the start of each section, accompanied by references. They were selected based on the best evidence and accepted by the project's expert advisory group and external quality reviewers.
- Where possible, separate recommendations for assessment and interventions are given. Assessment recommendations have been developed by the expert group based on current practice and a review of the literature discussed in the text of each section.
- Intervention recommendations are based on a review of the research on the use of the intervention. Each recommendation is accompanied by a reference to the highest quality study upon which it is based, as well as a level of evidence.

Recommendations based on evidence nearer the **I** end of the scale should be implemented, whereas recommendations based on evidence nearer the **IV** end of the scale should be considered for implementation on a case-by-case basis, taking into account the individual circumstances of the older person.

The highest level of evidence for an intervention is reported regardless of the setting; however, when the research setting is not a hospital, an * is added to the level (eg Level I-*). This shows that caution is needed when applying that recommendation to the hospital setting.

Good practice points

Good practice points have been developed for practice where there have not been any studies; for example, where there are no studies assessing a particular intervention, or where there are no studies specific to a particular setting. In these cases, good practice is based on clinical experience or expert consensus.

Point of interest

These boxes indicate points of interest. Most points of interest were revealed by the Australia-wide consultation process or from grey literature (conference proceedings, etc).

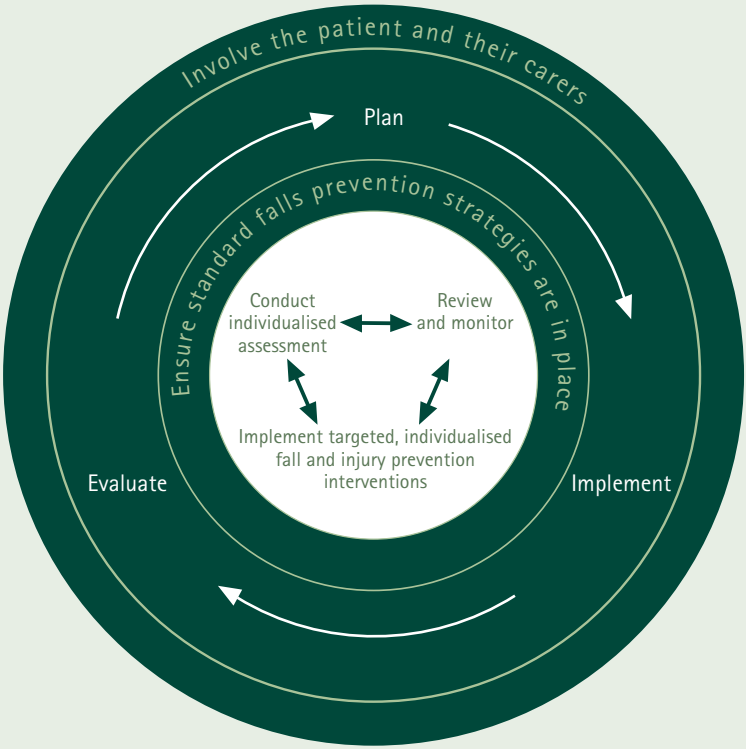
Case study

These boxes indicate case studies. The case studies provide information on likely scenarios, which are used as illustrative examples.

1.4 How to use the guidelines

This quick reference guide is intended for use as a supplementary resource to the Falls Guidelines. Figure 1.1 illustrates how to use the guidelines to prevent falls and falls injuries. Involvement of the patient and their carers is necessary at all stages.

At a strategic level, a falls prevention program needs planning, implementation and evaluation, as represented by the outer circle in Figure 1.1. The inner circle represents standard falls prevention strategies that are implemented at the individual or point-of-care level (see Parts B-D of the Falls Guidelines). Individualised assessment, targeted and individualised interventions, and continuous review and monitoring, are recommended (see Chapters 4 and 5 of the Falls Guidelines).



Plan

Plan for implementation

Step 1: Identify teams
Step 2: Identify, consult, analyse and engage key stakeholders
Step 3: Assess organisational readiness
Step 4: Analyse falls

Plan for evaluation

Step 5: Establish a baseline

Plan for quality improvement

Step 6: Review current clinical practice

Implement

Step 7: Decide on implementation approaches
Step 8: Determine process for implementation
Step 9: Conduct trial
Step 10: Learn from trial
Step 11: Proceed to widespread implementation for improvement
Step 12: Sustain implementation

Evaluate

Step 13: Measure process
Step 14: Measure outcomes
Step 15: Report and respond to results

Figure 1.1 Using the guidelines to prevent falls in Australia

2 Involving the patient and their carers

Good practice point

Consumer participation in health is central to high-quality and accountable health services. It also encourages shared responsibility in health care. Consumers can help facilitate change in health care practices.

Health care professionals should consider the following things to encourage patients to participate in falls prevention:

- Make sure the falls prevention message is presented within the context of people staying independent for longer.[2]
- Be aware that the term 'falls prevention' could be unfamiliar and the concept difficult to understand for many people in this age group.[2]
- Provide relevant and usable information to allow patients and their carers to take part in discussions and decisions about preventing falls[3] (see the fact sheets on preventing falls).
- Find out what changes a patient is willing to make to prevent falls, so that appropriate and acceptable recommendations can be made.[3]
- Offer information in languages other than English, where appropriate;[3] however, do not assume literacy in the patient's native language.
- Explore the potential barriers that prevent patients from taking action to reduce falls (such as low self-efficacy and fear of falling) and support patients to overcome these barriers.[3]
- Develop falls prevention programs that are flexible enough to accommodate the patient's needs, circumstances and interests.[3]
- Place falls prevention posters in the ward in common areas used by patients and family members.
- Ask family members to assist in falls prevention strategies.
- Ensure that strategies to promote the continued involvement of patients are included in the discharge plan and recommendations.
- Trial a range of interventions with the patient.[4]


N
H
T
A
O
C L
E N T
A O C
H L N

3 Standard falls prevention strategies

3.1 Falls prevention interventions

Recommendations

Intervention

- A multifactorial approach to preventing falls should be part of routine care for all older people in hospitals. (Level I)[5,6]
- Develop and implement a targeted and individualised falls prevention plan of care based on the findings of a falls screen or assessment. (Level II)[7-9]
- As part of discharge planning, organise an occupational therapy home visit for people with a history of falls, to establish safety at home. (Level II)[10]
- Patients considered to be at higher risk of falling should be referred to an occupational therapist and physiotherapist for needs and training specific to the home environment and equipment, to maximise safety and continuity from hospital to home. (Level I)[11]

Good practice points

- Interventions should systematically address the risk factors identified, either during the admission or, if this is not possible, through discharge planning and referral to community services.
- Screen patients for falls risk and functional ability, and ensure that referrals for follow-up falls prevention interventions are in place.
- Managing many of the risk factors for falls (eg delirium or balance problems) will have wider benefits beyond falls prevention.

3.1.1 Choosing falls prevention interventions

Successful falls prevention interventions in hospitals use a combination of falls prevention strategies that should be delivered together as part of a multifactorial program. Using any one intervention on its own is unlikely to prevent falls in the hospital setting.

All staff members (including support, clinical, administrative and managerial staff), as well as the patient and their carers (where appropriate), have a role to play in falls prevention, as outlined below.

The following standard falls prevention strategies have been used as interventions in successful in-hospital trials and should be included in routine practice:

- Screen or assess all older people in hospitals for their risk of falling, using a validated tool.[9]
- Identify high-risk patients by using falls risk alert cards above beds.[9]
- Screen eyesight, and ensure patients have their usual spectacles and visual aids to hand. Refer the patient to an optician, orthoptist or ophthalmologist for undiagnosed visual problems.[7]
- Review medications. In particular, identify high-risk medications, such as sedatives, antidepressants, antipsychotics and centrally acting pain relief, and ask the medical team or pharmacists to review the need for these medications.[7]
- Measure postural blood pressure as part of a medical review to identify patients with a significant drop in blood pressure. Investigate the cause, and provide slow and careful transfers with assistance for these people.[7]
- Organise routine screening urinalysis to identify urinary tract infections, with medical review if positive.[7,8]
- Organise routine physiotherapy review for patients with mobility difficulties, including transfers[7-9]
  - communicate to staff and the patient the limits of the patient's mobility status[12] using written, verbal and visual communication
  - put walking aids on the side of the bed that the patient prefers to get up from[13] and, where possible, assign a bed that allows them to get up from their preferred side
  - supervise or help the patient if required[14,15]
  - make sure that, while mobilising, the patient wears fitted, nonslip footwear[14,15] (discourage the patient from moving about in socks, surgical stockings or slippers)
  - encourage the patient to participate in functional activities and exercise (minimise prolonged bedrest and encourage incidental activity)[15,16]
  - in rehabilitation settings, organise physiotherapist-led exercise sessions to improve balance (eg tai chi and functional activities that are progressive and tailored to individual needs).[9]
- Educate and discuss (with regular review) falls risks and falls prevention strategies with all staff, patients and their carers.[8,9,15,17]
- Record falls prevention education of staff, patients and their carers.[17] Document screening, assessment and interventions.
- Establish a plan of care to maintain bowel and bladder function.[15]

- Instruct patients who are being discharged or transferring between facilities about their medication time and dose; side effects; and interactions with food, other medications and supplements.[15] Make sure that unnecessary medications are not prescribed and that information about medications is shared accurately with all relevant medical practitioners.
- Make the environment safe[7] by ensuring that
  - the bed is at the appropriate height for the patient (in most cases, it should be at a height that allows the patient's feet to be flat on the floor, with their hips, knees and ankles at 90-degree angles when sitting on the bed), and the wheels or brakes are locked when the bed is not being moved[14,15,17]
  - the room is kept free from clutter or spills[17]
  - adequate lighting is supplied, based on the patient's needs (particularly at night)[15,17]
  - the patient knows where their personal possessions are and that they can access them safely (including telephone, call light, bedside table, water, eyeglasses, mobility aid, urinal)[12,14,15,17]
  - floor surfaces are clean and dry, and 'wet floor' signs are used when appropriate.[15]
- Orientate the patient to the bed area, room, ward or unit facilities and tell them how they can obtain help when they need it.[12,15,17] Some patients need repeated orientation because of cognitive impairment; they also might need appropriate signage in suitable script and language to reinforce messages.
- Instruct and check that patients understand how to use assistive devices (eg walking frames) before they are prescribed.[15]
- Have a policy in place to minimise the use of restraints and bedside rails,[7,15] or to ensure that they are used appropriately and only when alternatives have been exhausted, and where their use is likely to prevent injury. In addition, the policy for restraint use should ensure that the risk of injury and falls is balanced against the potential problems of using restraints.[18]
- Consider vitamin D supplementation with calcium as a routine management strategy in older patients who are able to walk, or if a patient lives in a residential aged care facility. If a patient has a low-trauma fracture, consider osteoporosis management.[8]
- Place high-risk patients within view of, and close to, the nursing station.[7]
- Consider hip protectors[9] and alarm devices (eg bed or chair alarms) for patients at high risk of falling.

3.1.2 Discharge planning

Interventions to reduce the risk of falls and harm from falls should be included in discharge planning (also called 'post-hospital care planning') for those patients who have been identified as having an increased risk of falls and fall injury during the hospital admission.

Patients may present to acute services with a range of risk factors, and may leave with some or all of these risk factors (eg poor vision). Other risk factors may be acquired as part of the events of the admission; for example, gait changes or dizziness. Falls risk is increased for one month after discharge from hospital.

Some risk factors for falls (eg certain medications) can be managed during admission. However, some falls risk factors (eg muscle weakness) require longer term interventions. An exercise program can be started during admission, but needs to continue for some weeks after discharge to achieve optimal muscle strength.

Discharge planning should therefore start early during admission (or during pre-admission, if admission is planned). It should involve appropriate members of the multidisciplinary care team, and include referral to appropriate primary health provider(s) and community services. Communication with the individual and carer(s) will help to ensure that the benefits and rationale of discharge planning are understood, and that plans are followed.

Discharge planning from the emergency department

Identifying falls and risk factors for falls injuries is crucial while the patient is in the emergency department. The emergency department also provides an ideal opportunity for developing plans to minimise these risk factors through discharge planning processes.[19,20]

In its work with the Falls Risk for Hospitalised Older People (FRHOP), the National Ageing Research Institute (NARI) developed the following five key recommendations for preventing falls in the emergency department setting:[21]

- All emergency departments should have a policy that outlines procedures for screening, management and referral of older people presenting to the emergency department as a result of a fall.
- All emergency department staff should have an opportunity for orientation training and ongoing education that includes falls prevention policy and procedures, and research evidence to support these.

- An evidence based screening procedure that identifies older people who present to the emergency department and have a risk of future falls should be implemented independently, or within an overall falls risk screen.
- All older people with an elevated falls risk should have modifiable falls risk factors addressed.
- All older people with a high falls risk identified during screening should have a comprehensive falls risk assessment conducted by a trained practitioner using a validated tool.

NARI also identified the following four best practice points for falls prevention in the emergency department:[22]

- The patient's primary health provider should be informed of the risk screening result and subsequent referrals.
- The emergency department should identify a clear referral pathway for patients who have a high risk of falls or have modifiable falls risk factors.
- Emergency department staff should communicate clearly to patients and their carer(s) about the potential benefit and rationale for referrals and interventions for reducing falls risk.
- Emergency departments should review the completion of falls risk screening and referral as part of their routine review of medical records.

3.1.3 Falls clinics

Falls clinics are conducted by a multidisciplinary team with skills in falls assessment and management for patients who have fallen.[23] Limited numbers of falls clinics are available, and a referral is usually required. Falls clinics are usually conducted as a part of an outpatient service. The team usually develops an intervention strategy for the patient, as well as advice, education and training for the patient, their carer and other members of the health care team. Falls clinics can also refer the patient to mainstream services for ongoing management.

Falls clinics should not be the first intervention for a patient who has fallen, or who is at risk of falling.

Multifactorial case study — decreasing the number of risk factors can reduce the risk of falling[12]

Mrs R is a 79-year-old woman who was transferred by ambulance to hospital from her residential aged care facility 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 orthopaedic team admitted Mrs R from the emergency department. Because the fracture was stable, they decided that she would be allowed to walk and weight bear as pain permitted. From the outset, nursing staff implemented standard strategies for falls prevention and, because Mrs R was admitted as the result of a fall, staff completed a falls risk assessment rather than a less detailed falls risk screen.

Information from the falls risk assessment and the accompanying transfer letter from Mrs R's residential aged care facility revealed that she had multiple risk factors for falling, including that she:

- was older than 65 years
- had fallen three times in the previous year
- was taking five different medications, including a sleeping tablet and diuretic
- on last attempt (a month ago), was only able to complete the Timed Up and Go Test in 19 seconds with her wheelie walker; the mean time for healthy 71–79-year-olds is 15 seconds[24]
- was frequently incontinent of urine at night and regularly rushed to the toilet
- had a Mini-Mental State Examination score of 22/30 before falling and was frequently agitated (a score of less than 24 indicates cognitive impairment)
- had left foot pain as the result of severe hallux valgus
- wore bifocal glasses for all activities, despite having a second pair of distance glasses for walking
- did not like to venture outdoors and received no direct sunlight.

In addition to the standard strategies and in response to the risk assessment, the hospital staff implemented targeted, individualised interventions to reduce Mrs R's risk of falling. These interventions included a medication review and advice on the importance of getting enough sunlight for vitamin D by the medical officer; advice from the occupational therapist about wearing well-fitting shoes with nonslip soles; and some simple exercises for strengthening core body muscles for better balance, demonstrated by the physiotherapist. As a result of these multifactorial interventions:

- the possibility of medication interactions and adverse medicine events was minimised
- Mrs R had a more restful sleep due to physical exertion throughout the day
- Mrs R's urinary incontinence was better managed

- Mrs R experienced fewer episodes of agitation
- Mrs R had less pain in her left foot from her hallux valgus
- Mrs R was able to clearly see the floor in front of her while walking
- the condition of Mrs R's muscles and bones was optimised.

The health care teams at both the hospital and the residential aged care facility were all made aware of changes to Mrs R's care through chart entries, case conferences and appropriate discharge correspondence. Mrs R and her family were made aware of the changes to her care through a scheduled meeting with the health care team.

3.2 Falls risk screening and assessment

Recommendations

Screening and assessment

- Document the patient's history of recent falls or use a validated screening tool to identify people with risk factors for falls in hospital.
- Use falls risk screening and assessment tools that have good predictive accuracy, and have been evaluated and validated across different hospital settings.
- As part of a multifactorial program for patients with increased falls risk in hospital, conduct a systematic and comprehensive multidisciplinary falls risk assessment to inform the development of an individualised plan of care to prevent falls.
- When falls risk screens and assessments are introduced, they need to be supported with education for staff and intermittent reviews to ensure appropriate and consistent use.

Good practice points

Falls risk screening

- Screening tools are particularly beneficial because they can form part of routine clinical management and inform further assessment and care for all patients — even though clinical judgment is as effective as using a screening tool in acute care.
- All older people who are admitted to hospital should be screened for their falls risk, and this screening should be done as soon as practicable after they are admitted.
- The emergency department represents a good opportunity to screen patients for their falls risk.
- A falls risk screen should be undertaken when a change in health or functional status is evident, or when the patient's environment changes.

Falls risk assessment

- A falls risk assessment should be done for those patients who exceed the threshold of the falls risk screen tool, who are admitted for falls, or who are from a setting in which most people are considered to have a high risk of falls (eg a stroke rehabilitation unit).
- For patients who have fallen more than once, undertake a full falls risk assessment for each fall (approximately 50% of falls are in patients who have already fallen).
- Interventions delivered as a result of the assessment provide benefit, rather than the assessment itself; therefore, it is essential that interventions systematically address the risk factors identified.

3.2.1 Organising a falls risk screen

Falls risk screening is a brief process of estimating a person's risk of falling, classifying people as being at either low risk or increased risk. Falls risk screening usually only involves reviewing up to five brief items. Although it is not designed as a comprehensive assessment, positive screening on certain screen items can also provide information about intervention strategies. When a falls risk screen is introduced, it needs to be supported with education for staff and intermittent reviews to ensure that it is used appropriately and consistently.

Falls risk screening can be done by a member of the multidisciplinary health care team who understands the process, and can administer the tool, interpret the results, and make referrals where indicated. Falls risk screening should occur as soon as practicable after every older person is admitted to hospital. A person's risk of falling can change quickly; therefore, screening for falls risk should be done when changes are noted in a person's health or functional status, and also when their environment changes.

Table 3.1 summarises validated falls risk screening tools for the hospital setting. Other validated screening tools for the hospital setting are the Downton index and Morse scale.[25,26]

Table 3.1 Screening tools

St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY)[27]	
Description	The tool contains five clinical factors associated with falling, and a simple scoring system.
Time needed	1–2 minutes
Criterion	A positive score on ≥2 out of 5 items indicates increased risk of falls and need for a detailed risk assessment.
Ontario Modified STRATIFY[28]	
Description	The tool contains six clinical factors associated with falling (falls history, mental status, vision, toileting, transfer between chair and bed, and mobility score). Management strategies are provided, according to the participant's overall score.
Time needed	1–2 minutes
Criterion	A score of 0–5 = low risk A score of 6–16 = medium risk A score of 17–30 = high risk

The screen should be used to guide more detailed assessment and subsequent targeted interventions. The outcomes of the screen should be documented, reported to other health care staff, and discussed with the patient and their carer(s) (where appropriate). When the threshold score of a screening tool is:

- *exceeded*, a falls risk assessment should be done as soon as practicable
- *not exceeded*, the patient is considered to be at low risk of falling, and standard falls prevention strategies apply.

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

Screening risk in the emergency department

The emergency department provides a useful opportunity to screen older people for their risk of falling, and to refer them for assessment. Risk screening tools have been devised for use in the emergency department for measuring falls risk factors and identifying older people at increased risk of falling after they return home. Two are recommended in Table 3.2.

Table 3.2 Risk screening tools for the emergency department setting

FROP-Com screening tool[29]	
Description	A three-item screening tool, developed based on research using the FROP-Com assessment tool in a sample of older people presenting to an emergency department after a fall. The three items are steadiness during walking and turning, history of falls in the past 12 months, and the need for assistance with activities of daily living before the presenting fall.
Time needed	1–2 minutes
Criterion	A score of 4 or more indicates high risk.
Prevention of Falls in the Elderly Trial (PROFET)[30]	
Description	The first four questions of the PROFET trial include assessment of falls history, medical history, social circumstances and a physical examination.
Time needed	1–2 minutes
Criterion	No criterion for high falls risk. Individual risk factors identified are addressed according to guidelines.

3.2.2 Organising a falls risk assessment

To develop an individualised plan for daily care focused on preventing falls, the factors contributing to a patient's increased risk of falling need to be identified systematically and comprehensively.[7,8]

A falls risk assessment should be done for those patients who exceed the threshold of the falls risk screen tool, who are admitted for falls, or who are from a setting in which most people are considered to have a high risk of falls (eg a stroke rehabilitation unit).

A falls risk assessment should be done as soon as possible after the patient is admitted into a high-risk setting, or as soon as possible if a falls risk screen exceeds the threshold. Additionally, a falls risk assessment may need to be repeated:

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

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

Due to the multifactorial nature of falls, it is preferable that different members of the multidisciplinary health care team (rather than a single member) assess the falls risk, where possible. However, if the multidisciplinary health care team is involved in the assessment process, responsibility for ensuring its timely completion should be allocated to one staff member. If a multidisciplinary approach is not possible, nursing staff may be primarily responsible, bringing in medical and other health care professionals where needed. For example, in acute hospitals, a multidisciplinary assessment is unlikely to be the best choice, because not all patients are seen (or could be seen) for an assessment by an allied health professional within one to two days of admission.

Point of interest

In its work with the Falls Risk for Hospitalised Older People (FRHOP), the National Ageing Research Institute (NARI) found a number of limitations when different health care professionals are performing elements of an assessment, compared with a single-discipline assessment.[31] These limitations include:

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

Establishing clear protocols for using falls risk assessment tools (ie which staff member(s) completes them, when they are completed, and how referrals and management options are initiated); a clear process for integrating components of the risk assessment; and effective communication strategies to all staff about the process, level of risk and interventions being recommended for each patient are needed to overcome these limitations.[31]

Several falls risk assessment tools have been developed for use in the hospital setting. Given that a number of falls risk assessment tools have been validated for use in this setting, a validated tool should be used, instead of developing a new tool. However, the health care team should be careful when adapting existing tools to their particular location, because this limits the applicability of any previous validation studies.

In any falls risk assessment, both intrinsic and extrinsic risk factors related to a person's health, functional status and environment need to be considered. Most tools focus on intrinsic falls risk factors only, so a separate environmental assessment may be indicated to identify extrinsic falls risk factors. The recommended risk assessment tools that are included as appendices in the Falls Guidelines were chosen based on their applicability to Australian hospitals (see Table 3.3).

Table 3.3 Risk assessment tools

In the acute hospital setting	
Care plan assessment items[7]	
Description	Twelve items are incorporated into the daily care plan, including intrinsic risk factors (medications, vision, blood pressure, mobility, etc), as well as environmental risk factors (safe environment, appropriate bed height, nurse call bell accessible, etc).
Time needed	Approximately 5–10 minutes
Criterion	No criterion for high falls risk. Individual risk factors identified are addressed according to guidelines.
In the subacute or rehabilitation setting	
Peninsula Health Falls Risk Assessment Tool (FRAT)	
Description	The FRAT has three sections: Part 1 — falls risk status, Part 2 — risk factor checklist and Part 3 — action plan. The complete tool (including the instructions for use) is a full falls risk assessment tool. However, Part 1 can be used as a falls risk screen.
Time needed	Approximately 15–20 minutes
Criterion	A score of ≥12 indicates an increased risk of falls.

Falls Risk for Hospitalised Older People (FRHOP)[32]	
Description	The FRHOP is a comprehensive risk assessment tool that includes a broad range of falls risk factors, most of which are graded from nil (0) to high (3) risk. The tool has accompanying strategies that can be used to develop an action list. It also has additional actions for minimising overall risk.
Time needed	Approximately 20 minutes
Criterion	An overall score of 23 or more, or more than four items rated as high risk, indicates an increased risk of falls.
In the subacute or rehabilitation setting	
Peter James Centre Fall Risk Assessment Tool (PJC–FRAT)[33]	
Description	The PJC-FRAT is a multidisciplinary falls risk assessment tool (medical, nursing, physiotherapy and occupational therapy staff assessment components), which was used as the basis for developing intervention programs in a randomised controlled trial in the subacute hospital setting that successfully reduced patient or resident falls. Four main interventions are linked to the assessment: falls risk alert card, additional exercise, falls prevention education, and hip protectors.
Time needed	Approximately 15 minutes
Criterion	No criterion for high falls risk. Individual risk factors identified are addressed according to guidelines.

So far, there is no consensus on which falls risk factors should be included in a falls risk assessment tool. Three reviews have been published on falls risk assessment, which identified several risk factors as being more prevalent in fallers than in nonfallers.[34-36] Therefore, more specific assessments may be indicated for some risk factors.

Effective falls prevention programs have combined risk assessment with interventions. Interventions delivered as a result of the assessment, rather than the assessment itself, provide benefit; therefore, it is essential that interventions to address the identified risks are applied systematically.

The outcomes of the falls risk assessment, together with the recommended strategies to address identified risk factors, need to be documented, reported to other health care staff, and discussed with the patient and, where applicable, with their carer(s).

Case study

Mrs S presented to her local hospital after a fall with substantial bruising and a possible broken hip. X-ray revealed no fracture; however, she was admitted because severe pain limited her walking so that she could take only a few hobbling steps. Falls risk screening using the St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY) indicated a high risk of falling, with a score of four. (Mrs S had had three falls in the past 12 months, and had impaired vision, nocturia and urinary frequency, and difficulty with transfers and mobility). Once Mrs S was given pain relief, her pain settled, and her mobility improved over three days.

The nurse performed a detailed falls risk assessment using the Falls Risk for Hospitalised Older People (FRHOP), and a referral and management program was implemented (mostly linked to Mrs S's discharge planning, because she was discharged home two days later). This included an assessment by the ward physiotherapist, who gave Mrs S a balance and strengthening exercise program to do at home. Mrs S was also referred to:

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

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

4 Management strategies for common falls risk factors

4.1 Balance and mobility limitations

Recommendation

Intervention

- Use a multifactorial falls prevention program that includes exercise and assessment of the need for walking aids to prevent falls in subacute hospital settings. (Level II)[9]

Good practice points

- Refer patients with ongoing balance and mobility problems to a post-hospital falls prevention exercise program when they leave hospital. This should include liaison with the patient's general practitioner.
- To assess balance, mobility and strength, use an assessment tool to:
  - quantify the extent of balance and mobility limitations and muscle weaknesses
  - guide exercise prescription
  - measure improvements in balance, mobility and strength
  - assess whether patients have a high risk of falling.

4.1.1 Assessing balance, mobility and strength

A number of different approaches can be used to assess balance, mobility and strength in older patients. Some of the clinical assessments that may be of use are outlined in Table 4.1. The choice of tool will depend on the time and equipment available.

Table 4.1 Clinical assessments for measuring balance, mobility and strength

Balance	
Postural sway and leaning balance tests[37]	
Description	As part of the Physiological Profile Assessment (PPA), sway is measured using a swaymeter that measures displacements of the body at waist level. During standing balance tests, the person has to stand as still as possible for 30 seconds, with the eyes open then closed, once on the floor and once on a piece of medium-density foam rubber (15 cm thick). During leaning balance tests, the person has to lean forward and backward as far as possible, or follow a track.
Time needed	5–10 minutes
Criterion	Computer software program compares individual's performance to normative database compiled from population studies.
Rating	75% accuracy for predicting falls over a 12-month period in community and institutional settings; reliability within clinically expected range (R = 0.5–0.7).[37]
Balance	
Functional reach[38]	
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. Functional reach is a simple and easy-to-use clinical measure that has predictive validity in identifying recurrent falls.
Time needed	1–2 minutes
Criterion	A score of ≤6 inches: fourfold risk A score of ≤10 inches: twofold risk
Rating	76% sensitivity; 34% specificity[39]

Alternate Step Test[40]	
Description	The Alternate Step Test is a measure of lateral stability. It involves the time taken to complete eight steps, alternating between left and right foot, as fast as possible, onto a step 19 cm high and 40 cm deep.
Time needed	1–2 minutes
Criterion	10 seconds
Rating	69% sensitivity; 56% specificity
Mobility	
Six-Metre Walk Test[41]	
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
Criterion	6 seconds
Rating	50% sensitivity; 68% specificity[41]
Mobility	
Timed Up and Go Test[41]	
Description	The Timed Up and Go Test measures the time taken for a person to rise from a chair, walk three metres at normal pace and with their usual assistive device, turn, return to the chair and sit down.
Time needed	1–2 minutes[42]
Criterion	15 seconds
Rating	76% sensitivity; 34% specificity[24]

Strength	
Sit-to-Stand Test[40,42]	
Description	The Sit-to-Stand Test is a measure of lower limb strength and is the time needed to perform five consecutive chair stands from a seated position.
Time needed	1–2 minutes
Criterion	12 seconds
Rating	66% sensitivity; 55% specificity[41]
Spring balance[37]	
Description	As part of the PPA, the strength of three leg muscle groups (knee flexors and extensors and ankle dorsiflexors) is measured while participants are seated. In each test, there are three trials, and the greatest force is recorded.
Time needed	5 minutes
Criterion	Computer software program compares individual's performance to normative database compiled from population studies.
Rating	75% accuracy for predicting falls over a 12-month period in community and institutional settings; reliability coefficients within expected range (0.5–0.7).[37]

Composite scales	
Berg Balance Scale[43]	
Description	The Berg Balance Scale is a 14-item scale designed to measure balance of the older person in a clinical setting, with a maximum total score of 56 points.†
Time needed	15–20 minutes
Criterion	A score of ≤20 = high risk of falls A score of ≤40 = moderate risk of falls (potential ceiling effect with less frail people)
Rating	High test-retest reliability (R = 0.97); low sensitivity – an 8-point change is needed to reveal genuine changes in function.
Tinetti Performance-Oriented Mobility Assessment Tool (POMA)[44]	
Description	The POMA measures a person's gait and balance. The POMA-T (total) score consists of two subscores: POMA-G (gait) and POMA-B (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
Criterion	A score of <19 = high risk of falls A score of <24 = moderate risk of falls
Rating	High test-retest reliability for POMA-T and POMA-B (R = 0.74–0.93); lower test-retest reliability for POMA-G (R = 0.72–0.89). POMA-T sensitivity (62.%) and specificity (66.1%) indicate poor accuracy in falls prediction.

† http://www.chcr.brown.edu/geriatric_assessment_tool_kit.pdf

Confidence and falls efficacy scale	
Falls Efficacy Scale International[45]	
Description	The Falls Efficacy Scale International provides information on level of concern on a four-point scale (1 = not at all concerned, to 4 = very concerned) across 16 activities of daily living (eg cleaning the house, simple shopping, walking on uneven surfaces).
Time needed	5 minutes
Criterion	A score of ≤22 = low to moderate level of concern A score of ≥23 = high level of concern
Rating	High test-retest reliability (R = 0.96)[45]

In addition to structured training programs, hospital staff should provide the patient with opportunities to be as active as possible throughout the day. For example, the patient's bedrest should be minimised during the day, and the patient should be encouraged to be mobile by increasing the amount of incidental activity (eg walking to the toilet with appropriate supervision).[46,47]

Case study

Mrs B is 83-years-old and was admitted to hospital with a urinary tract infection. She was confused and unable to walk on her own as she normally did. Nursing staff ensured that Mrs B did not walk unsupervised, that frequently used items were within easy reach, and that family members visited to provide additional supervision. As part of a multifactorial falls prevention program, the physiotherapist assessed Mrs B and provided daily balance and mobility training, which improved her function and mobility so that she was independent with a walking stick before she was discharged. The physiotherapist also referred Mrs B to a community-based balance and strength program after she left hospital.

4.2 Cognitive impairment

Recommendations

Assessment

- Older people with cognitive impairment should have their risk factors for falls assessed.

Intervention

- Identified falls risk factors should be addressed as part of a multifactorial falls prevention program, and injury minimisation strategies (such as using hip protectors or vitamin D and calcium supplementation) should be considered. (Level II)[7-9]

Good practice points

- Patients presenting to a hospital with an acute change in cognitive function should be assessed for delirium and the underlying cause of this change.
- Patients with gradual onset, progressive cognitive impairment should undergo detailed assessment to determine diagnosis and, where possible, reversible causes of the cognitive decline.
- Patients with delirium should receive evidence based interventions to manage the delirium (eg follow the Australian guidelines *Clinical Practice Guidelines for the Management of Delirium in Older People*).†
- If a patient with cognitive impairment does fall, reassess their cognitive status, including presence of delirium (eg using the Confusion Assessment Method tool).
- Where possible and appropriate, involve family and carers in decisions about which implementations to use, and how to use them, for patients with cognitive impairment. (Family and carers know the patient and may be able to suggest ways to support them.)
- Interventions shown to work in cognitively intact populations should not be withheld from cognitively impaired populations; however, interventions for people with cognitive impairment may need to be modified and supervised, as appropriate.

† http://www.health.vic.gov.au/acute-agedcare/delirium-cpg.pdf

4.2.1 Assessing cognitive impairment

Older people with cognitive impairment have an increased risk of falls, and risk factors for falls are more prevalent in older people with cognitive impairment than in people without cognitive impairment. Therefore, one of the most important initial steps in preventing falls in older people is to assess for cognitive impairment. Although there is no specific evidence for falls prevention interventions for patients with cognitive impairment, the following strategies reflect best practice:

- Repeatedly and regularly check for the presence of delirium, and treat medical conditions that may contribute to an alteration in cognitive status. Rapid diagnosis and treatment of a delirium and its underlying cause (eg infection, dehydration, constipation, pain) are crucial.[48]
- Older patients with a progressive decline in cognition should undergo detailed assessment to determine diagnosis and, where possible, treat reversible causes of the cognitive decline.[49]
- Older patients with cognitive impairment should have falls risk factors assessed, as discussed in other chapters, and should be offered interventions to modify risk.[6] Some interventions need the patient to be able to follow instructions or comply with a program (eg exercise). Where there is doubt about a patient's ability to follow instructions safely, the health care team should conduct an individualised assessment and develop a falls prevention plan using the information from the assessment.

Many tools can be used to assess cognitive status; some are summarised in Table 4.2.

Table 4.2 Tools for assessing cognitive status

Folstein Mini-Mental State Examination[50]	
Description	The Folstein Mini-Mental State Examination is a widely used method for assessing cognitive mental status. It 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.
Time needed	5–10 minutes
Criterion	A score ≤23 indicates mild cognitive impairment A score ≤18 indicates severe cognitive impairment

Rowland Universal Dementia Scale[51,52]	
Description	The Rowland Universal Dementia Scale is a simple method for detecting cognitive impairment. The scale is valid across cultures, portable and administered easily by primary health care clinicians. It 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)
Rating	89% sensitivity; 98% specificity
Confusion Assessment Method[53]	
Description	The Confusion Assessment Method is a comprehensive assessment instrument that screens for clinical features of delirium. It comprises four features, which are determined by the patient, nurse and family interview: • an onset of mental status changes or a fluctuating course • inattention • disorganised thinking • an altered level of consciousness (ie other than alert).
Time needed	5 minutes
Criterion	The patient is diagnosed as delirious if they have both the first two features, and either the third or fourth features.
Rating	94% sensitivity; 90% specificity[54]

4.2.2 Providing interventions

Identified falls risk factors should be addressed as part of a multifactorial falls prevention program, and injury minimisation strategies (such as using hip protectors or vitamin D and calcium supplementation) could be instituted.

The following falls prevention strategies are of particular relevance to older patients with cognitive impairment:

- Address reversible causes of acute or progressive cognitive decline.[55]
- Review previously prescribed medications for conditions that the patient no longer has (eg antidepressants, antipsychotics, antihypertensives, antianginals).[55]
- Treat orthostatic hypotension (which is common in patients with dementia).[55]
- Use physical training programs to improve gait, balance, mobility and flexibility.[55]
- Modify the environment to reduce slips and trips, such as lowering beds.[55]
- Avoid the use of restraints or immobilising equipment (including indwelling catheters).[6]
- Provide more frequent observation, supervision and assistance to ensure that older patients with delirium or dementia who are not capable of standing and walking safely receive help with all transfers.[55]
- Use fall-alarm devices to alert staff that patients are attempting to mobilise.[6]

The symptoms of cognitive impairment and delirium should be managed by addressing agitation, wandering and impulsive behaviour (behaviour management) as follows:[56,57]

- Identify causes of agitation, wandering and impulsive behaviour, and reduce or eliminate them.
- Avoid the risk of dehydration by having fluids available and within a patient's reach, or by offering fluids regularly.
- Avoid extremes of sensory input (eg too much or too little light, too much or too little noise).
- Promote exercise and activity programs; more intensive activity programs may need to be offered in the late afternoon or early evening to rechannel agitated behaviours (eg pacing may be redirected into walking or dancing; noises may be channelled into singing or music playing).
- Promote companionship, if appropriate.

- Establish orientation programs using environmental cues and supports (including having personal or familiar items available). Repeat orientation and safety instructions regularly, keeping instructions simple and consistent.
- Encourage sleep without the use of medication, and promote and support uninterrupted sleep patterns by reducing noise and minimising disturbance.
- Encourage patients to participate in activities to avoid excessive daytime napping.
- Ensure personal needs are met on a regular basis.
- When communicating with cognitively impaired 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 with communication. It is important that the patient understands what is being said; this can be helped by using repetition and paraphrasing, and allowing time for them to process the information.

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[58] to maintain oral hydration in residents of residential aged care facilities.[59] Although adherence was problematic, the following strategies recommended by the Joanna Briggs Institute may be beneficial:

- Drinks (cordial, juice and water, but not caffeinated drinks) were offered by staff every 1.5 hours (as well as morning tea, afternoon tea and supper rounds).
- Residents 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 were placed on all tables, with cups.
- Drinks were always given with medication.
- Icy poles, jellies and ice-cream were offered throughout the day as snacks and enjoyable treats.
- Fruit with a high water content (eg 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 nonalcoholic wines, mocktails, soft drinks and nibbles.
- Warm milk drinks were given to help people settle at night.

These strategies may also be applicable for older people with cognitive impairment in hospital.

Case study

Mr T is an independent, cognitively intact 79-year-old man living with his wife in the community. He was admitted to hospital with respiratory distress and a history of partial blindness and diabetes. Following his admission, Mr T's condition deteriorated, and he became acutely confused secondary to a respiratory tract infection. He pulled out his intravenous line through which he was receiving antibiotics. During the phase of significant agitation, the staff on the ward organised a roster with Mr T's wife and family so that a family member was able to sit with him. As his delirium began to settle, the need for constant one-on-one supervision decreased, but the staff did use a seat alarm device to alert them if Mr T tried to get up without the needed supervision. After active treatment of the infection, Mr T's delirium resolved and the alarm mat was removed.

4.3 Continence

Recommendations

Intervention

- Ward urinalysis should form part of a routine assessment for older people with a risk of falling. (Level II)[7]
- As part of multifactorial intervention, toileting protocols and practices should be in place for patients at risk of falling. (Level III-2)[60,61]
- Managing problems with urinary tract function is effective as part of a multifactorial approach to care. (Level II)[7]

Good practice point

Incontinence can be screened in hospital as part of a validated falls risk screen assessment, such as the St Thomas Risk Assessment Tool in Falling Elderly In-patients (STRATIFY) or the Peter James Centre Fall Risk Assessment Tool (PJC-FRAT).

4.3.1 Screening continence as part of falls risk

People with urinary incontinence have an increased risk of hospital admission.[62] Furthermore, incontinence,[63,64] urinary frequency[27] and assisted toileting[63,65] have been identified as risk factors for falls in the hospital.

The cause of incontinence should be established through a thorough assessment. Patients may have more than one type of urinary incontinence, which can make assessment findings difficult to interpret.[66] Patients should be screened for urinary tract infections using ward urinalysis.[7] Otherwise, the following strategies can be used to assess the patient's continence status:

- Use the STRATIFY tool to screen continence status by asking 'Are there any alterations in urination (ie frequency, urgency, incontinence, nocturia)?'[27]
- Use the PJC-FRAT to screen continence status by asking if the patient is in need of especially frequent toileting (day and night).[9]
- Obtain a continence history from the patient. This might include a bladder chart (a frequency/volume chart) or a continence diary, which could be used to record a minimum of two days to help with assessment and diagnosis. Sometimes a bowel assessment is required, and the patient's normal bowel habits and any significant change must be determined, because constipation can considerably affect bladder function.
- Address, on an individual basis, the suitability of diagnostic physical investigations. Consent from the patient must be obtained before the physical examination, which should be done by a suitably qualified health professional.
- Always check post-void residuals in incontinent older patients.
- Consider risk factors for falling related to incontinence, along with the symptoms and signs of bladder and bowel dysfunction.
- Assess and address functional considerations, such as reduced dexterity or mobility, which can affect toileting.
- Assess the toilet for accessibility (especially if the patient uses a walking aid), and adjust the toilet height if the patient has any hip joint dysfunction.

4.3.2 Promoting continence

Appropriate management of continence may improve overall care. A practical, stepwise management approach for mobile and nonmobile patients, as well as patients with and without cognitive impairment, should be considered.

The following strategies, adapted from those recommended by the Third International Consultation on Incontinence 2005,[60] can be used to promote continence:

- Make sure the patient has access to a comprehensive and individualised continence assessment that identifies and treats reversible causes, including constipation and medication side effects.
- Use an adequate trial of conservative therapy as the first line of management.
- Establish treatment strategies as soon as incontinence has been diagnosed. The aim of managing urinary incontinence is to alter the factors causing incontinence and to improve the continence status of the patient. Management of incontinence is a multidisciplinary task that ideally involves doctors, nurse continence advisers, physiotherapists, occupational therapists and other suitably qualified health professionals.
- Address all comorbidities that can be modified.
- Make sure toileting protocols and practices are in place for patients at risk of falling.[61,67]
- Offer toileting assistance during frequent nursing rounds (every one to two hours), because this can prevent falls in hospital patients.[68]
- Encourage habit retraining, prompted voiding or timed voiding programs to help improve the patient's control over their toileting regime, and reduce the likelihood of incontinence episodes
  - timed voiding is characterised by a fixed schedule of toileting
  - habit retraining is based on identifying a pattern of voiding and tailoring the toileting schedule to the patient
  - prompted voiding aims to increase continence by increasing the patient's ability to identify their own continence status and to respond appropriately.
- Minimise environmental risk factors as follows
  - keep the pathway to the toilet obstacle free and (where relevant) leave a light on in the toilet at night
  - ensure the patient is wearing suitable clothes that can be easily removed or undone
  - recommend appropriate footwear to reduce slipping in urine

  - use a nonslip mat on the floor beside the bed for patients who experience incontinence on rising from the bed, particularly if on a noncarpeted floor in the bedroom; however, care must be taken when using mats to ensure the person does not trip on the mat
  - check the height of the toilet and the need for rails to assist the patient 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 with a continence adviser if usual continence management methods, as described above, are not working or the patient 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

Mrs U is an 85-year-old woman who was admitted to hospital after falling and breaking her arm. When the nurse asked why she fell, she said she was rushing to the toilet. A urinalysis done by the nurse showed leucocytes and nitrites. The sample was sent for culture and sensitivity. Mrs U had a confirmed urinary tract infection, which was then treated with a short course of antibiotics. Her urinary frequency and urgency settled with the treatment. Having sustained a low-trauma fracture, she was referred on discharge for a bone mineral density scan and formal assessment of bone health.

4.4 Feet and footwear

Recommendations

Assessment

- In addition to using standard falls risk assessments, screen patients for ill-fitting or inappropriate footwear upon admission to hospital.

Intervention

- Include an assessment of footwear and foot problems as part of an individualised, multifactorial intervention for preventing falls in older people in hospital. (Level II)[7]
- Hospital staff should educate patients and provide information about footwear features that may reduce the risk of falls. (Level II)[7]

Good practice points

- Safe footwear characteristics include:
  - *soles:* shoes with 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 stability.
- As part of discharge planning, refer patients to a podiatrist, if needed.

4.4.1 Assessing feet and footwear

Footwear is a contributing factor to falls[69] and fractures in older people.[70]

Hospital staff should arrange for the patient's feet and footwear to be assessed upon admission to hospital. As part of a multifactorial falls prevention program, this assessment should be done by a health professional skilled in the assessment of feet and footwear, such as a podiatrist. The following components of the assessment are most relevant:

- Footwear
  - Use the safe shoe checklist to assess footwear. This checklist is a reliable tool for evaluating specific shoe features that could potentially improve postural stability in older people.[71]
  - Discourage people from walking in socks, because this is associated with a 10-fold increased risk of falling.[72] This is particularly relevant in the hospital setting: older people should not walk in antiembolism stockings without appropriate footwear on their feet.
- Foot problems
  - Assess foot pain and other foot problems regularly. A patient with an undiagnosed peripheral neuropathy should be assessed for potentially reversible or modifiable causes of the neuropathy. Some of the more common causes of a peripheral neuropathy include diabetes, vitamin B12 deficiency, peripheral vascular disease, alcohol misuse and side effects of some drugs.[73]
- Refer the patient to a health professional who is skilled in the assessment of feet and footwear (eg a podiatrist) for additional investigations and management, as required.[74]

A detailed assessment by a podiatrist for a falls-specific examination of feet and footwear should include:[75]

- *fall history:* including foot pain and footwear
- *dermatological assessment:* skin and nail problems, infection
- *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 (eg hallux valgus), gait analysis
- *footwear assessment:* stability and balance features; prescription of footwear, footwear modifications or foot orthoses, based on assessment of gait in shoes
- *education:* foot care and footwear, link between footwear or foot problems and falls risk.

4.4.2 Improving foot condition and footwear

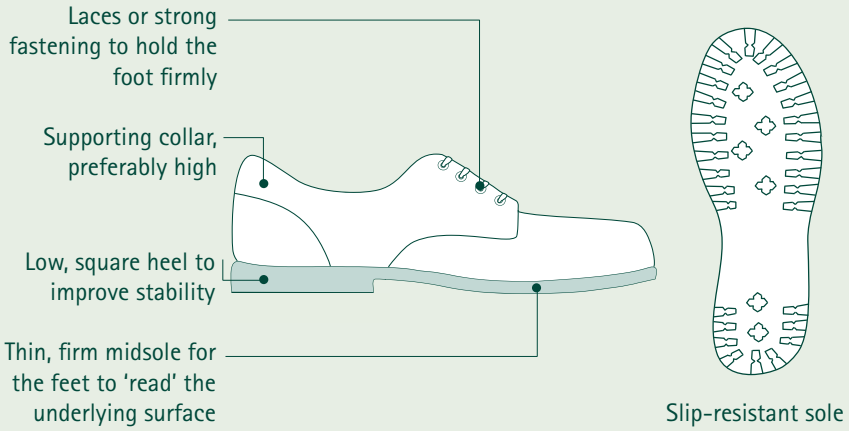
All health care professionals can play an important role in:

- identifying ill-fitting or inappropriate footwear[7,61]
  - providing information about footwear to older people and carers[7]
  - ensuring shoes are repaired as needed, and cleaned regularly
  - recognising that older people who have a shuffling gait may be at higher risk of falling if they wear nonslip shoes on certain carpeted floors
  - ensuring that people with urinary incontinence have dry, clean footwear
  - ensuring that older people have more than one pair of shoes, in case shoes are soiled or damaged
  - discouraging walking while wearing slippery socks and stockings
  - discouraging the use of talcum powders, which may make floors slippery
- screening older people for foot pain or foot problems
- educating older people and carers about basic foot care
- referring a patient to a podiatrist for further assessment and management, as appropriate, if any of the following conditions or clinical signs are evident
  - foot pain
  - foot problems, such as swelling, arthritis, bunions, toe deformities, skin and nail problems (especially corns and calluses) or other foot abnormalities (eg collapsed arch or high-arched foot)

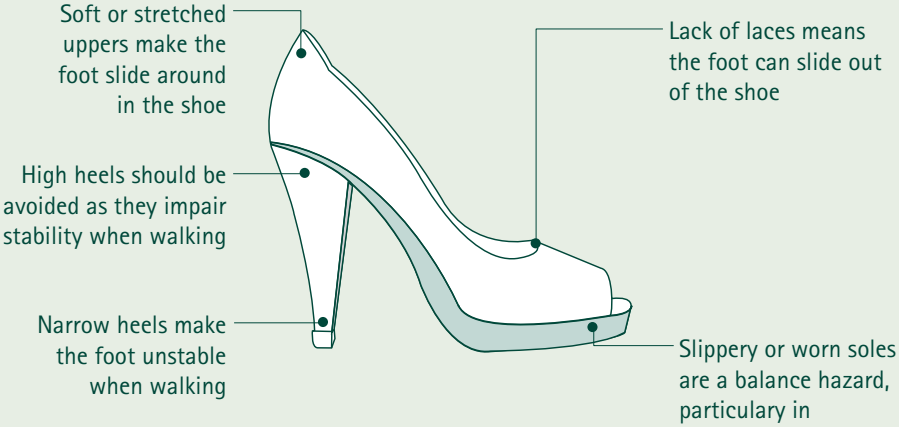
- conditions affecting balance, posture or proprioception in the lower limbs, such as diabetes, peripheral neuropathy or peripheral vascular disease
- unsteady or abnormal gait
- inappropriate or ill-fitting footwear or a requirement for foot orthoses

Figure 4.1 shows optimal 'safe' shoe, and a theoretical 'unsafe' shoe.

What makes a shoe safe?



What makes a shoe unsafe?



Source: Lord (2007)[135]

Figure 4.1 The theoretical optimal 'safe' shoe, and 'unsafe' shoe

Case study

Mr R is in hospital for management of his diabetes. He has a recent history of falls. As part of a multifactorial falls prevention program, nursing staff ran a basic foot screening and found that Mr R had poor sensation and some calluses and lesions on his feet. As a result of the assessment findings, they organised a podiatry assessment. The podiatrist found that Mr R had mild peripheral neuropathy and was unsteady on his feet because he wore oversized sports shoes with a thick, cushioned sole to 'help' his calluses. The podiatrist treated his lesions and referred him to a community podiatry service on discharge. The podiatrist also taught Mr R how to buy better fitting footwear that will improve his stability, but that is still safe for his neuropathic feet. Mr R found that his balance improved after he bought more appropriate footwear.

4.5 Syncope

Recommendations

Assessment

- Patients who report unexplained falls or episodes of collapse should be assessed for the underlying cause.

Intervention

- Patients with unexplained falls or episodes of collapse who are diagnosed with the cardioinhibitory form of carotid sinus hypersensitivity should be treated by inserting a dual-chamber cardiac pacemaker. (Level II)[76]
- Assessment and management of postural hypotension and review of medications, including medications associated with presyncope and syncope, should form part of a multifactorial assessment and management plan for falls prevention in hospitalised older people (this can also be part of discharge planning). (Level I)[5]

4.5.1 Assessing syncope

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

It is important to ensure that patients reporting dizziness, presyncope or syncope undergo appropriate assessment and intervention. Depending on the history and results of the clinical examination, a number of tests and further investigations may be warranted. These may include an electrocardiogram, echocardiography, Holter monitoring, tilt table testing and carotid sinus massage, or insertion of an implantable loop recorder.

Permanent cardiac pacing is successful in treating certain types of syncope. Pacemakers prevent falls by 70% in people with accurately diagnosed cardioinhibitory carotid sinus hypersensitivity.[76]

The symptoms of orthostatic hypotension can be reduced using the following strategies:

- Ensure good hydration is maintained, particularly in hot weather.[12,77,78]
- Encourage the patient to sit up slowly from lying, stand up slowly from sitting, and wait a short time before walking.[77,78]
- Minimise exposure to high temperatures or other conditions that cause peripheral vasodilation, including hot baths.[78]
- Minimise periods of prolonged bedrest and immobilisation.
- Encourage patients to rest with the head of the bed raised.
- Increase salt intake in the diet if not contraindicated.
- Where possible, avoid prescribing medications that may cause hypotension.
- Identify any need for using appropriate peripheral compression devices, such as antiembolic stockings.[78]
- Monitor and record postural blood pressure.[12]

Case study

Mr L is an 82-year-old man who was brought to the emergency department with acute pulmonary oedema secondary to his ischaemic heart disease. He was admitted and given diuretics to off-load the excess fluid. During the admission, he was also started on an angiotensin-converting enzyme inhibitor and beta-blocker. However, he started to report symptoms of dizziness on standing and almost blacked out on the way to the bathroom. Mr L's lying and standing blood pressures were checked, and he was found to have significant and symptomatic postural hypotension. His medications were reviewed, and his diuretic dose was reduced. Over the next few days, Mr L's lying and standing blood pressures were checked regularly to ensure resolution of the postural changes, and his chest was examined to ensure that the oedema did not recur.

4.6 Dizziness and vertigo

Recommendations

Assessment

- Vestibular dysfunction as a cause of dizziness, vertigo and imbalance needs to be identified in the hospital setting. A history of vertigo or a sensation of spinning is highly characteristic of vestibular pathology.
- Use the Dix-Hallpike test to diagnose benign paroxysmal positional vertigo, which is the most common cause of vertigo in older people and can be identified in the hospital setting. This is the only cause of vertigo that can be treated easily.

Note: there is no evidence from randomised controlled trials that treating vestibular disorders will reduce the rate of falls.

Good practice points

- Use the Epley manoeuvre to manage benign paroxysmal positional vertigo.
- Use vestibular rehabilitation to treat dizziness and balance problems, where indicated.
- Screen patients complaining of dizziness for gait and balance problems, as well as for postural hypotension. (Patients who complain of 'dizziness' may have presyncope, postural dysequilibrium, or gait or balance disorders.)
- All manoeuvres should only be done by an experienced person.

4.6.1 Assessing vestibular function

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. When patients describe being 'dizzy', 'giddy' or 'faint', this may mean anything from an anxiety or fear of falling, to postural dysequilibrium, vertigo or presyncope. Therefore, a detailed history is crucial.

An important step in minimising the risk from falls associated with dizziness is to assess vestibular function. This can be done using the following steps and tests (these tests should only be done by an experienced person):

- Ask the patient about their symptoms. *Dizziness* is a general term that is used to describe a range of symptoms that imply a sense of disorientation.[79] Dizziness may be used as a term by a patient to describe poor balance. *Vertigo*, a subtype of dizziness, is highly characteristic of vestibular dysfunction and is generally described as a sensation of spinning.[80]

- Assess peripheral vestibular function using the Halmagyi head-thrust test.[81] This test should only be done by an experienced person. It has good sensitivity only if the vestibular dysfunction is severe or complete.[82]
- Use audiology testing to quantify the degree of hearing loss. The auditory and vestibular systems are closely connected, and therefore auditory symptoms (hearing loss, tinnitus) commonly occur in conjunction with symptoms of dizziness and vertigo.[83]
- Use hospitalisation as an opportunity to request computed tomography or magnetic resonance imaging to identify an acoustic neuroma or central pathology, if clinically indicated.[80]
- Use the Dix-Hallpike manoeuvre to diagnose benign paroxysmal positional vertigo (BPPV) in the hospital setting. This manoeuvre is considered mandatory in all patients with dizziness and vertigo after head trauma.[84] BPPV should be strongly considered as part of the differential diagnosis in older people who report symptoms of dizziness or vertigo following a fall that involved some degree of head trauma.

4.6.2 Choosing interventions to reduce symptoms of dizziness

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

Medical management

Treatment in the hospital emergency department with methylprednisolone within three days of acute onset of vestibular neuritis (viral infection of inner ear structures) can improve vestibular function.[85]

Based on clinical experience, treatment in the acute hospital setting with antiemetics and vestibular suppression medication may be required to treat the unpleasant associated symptoms of nausea and vomiting. These medications should only be used for a short duration (one to two weeks) because they adversely affect the process of central compensation following acute vestibular disease.[86]

Treating BPPV

A range of options for the treatment of BPPV have been described in the literature. These include:

- Brandt and Daroff exercises — these can be done regularly at home[87]
- the Epley manoeuvre — this is used commonly by clinicians and involves taking the patient slowly through a range of positions that aim to move the freely mobile otoconia back into the vestibule;[88] a meta-analysis showed that this manoeuvre is highly successful for treating BPPV.[89]

Older people with diagnosed BPPV respond as well to treatment as the general population; therefore, no special approaches are needed in this older group.[90] It is important to diagnose and treat BPPV as soon as possible, because treatment improves dizziness and general wellbeing.[90]

Vestibular rehabilitation

Vestibular rehabilitation (VR) is a multidisciplinary approach to treating stable vestibular dysfunction. The physiotherapy intervention component focuses on minimising a person's complaints of dizziness and balance problems through a series of exercises, which are tailored to each person.[91] The occupational therapy intervention component involves incorporating the movements required to do these exercises into daily activities.[92] Psychology input addresses the emotional impact of vestibular dysfunction.[93]

The literature emphasises the following characteristics of VR:

- VR is highly successful in treating stable vestibular problems in people of all ages.[94]
- Starting VR early is recommended in the hospital setting after surgical removal of an acoustic neuroma[95] and vestibular ablation surgery.[96] Delayed initiation of VR is a significant factor in predicting unsuccessful outcomes over time.[97]
- VR can improve measures of balance performance in people living in the community who are older than 65 years.[98] No research has been done on specific vestibular interventions for preventing falls in the hospital setting. However, in the first six weeks after acoustic neuroma surgery, older people receiving VR had greater improvements in balance than those who received general instructions only.[99] This may translate to reduced risk of falling.

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

Discharge planning

Discharge planning (or 'post-hospital care planning') is a critical part of an integrated program of patient care, and should ensure that interventions started in hospital continue in the home, as necessary and possible. Older people who are discharged from hospital may still need care and support to manage dizziness when they return to their own homes or residential aged care facilities. Discharge planning may include the following:

- Use a vestibular function test to 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 following discharge from hospital.[100]
- Refer the patient to a specialist, such as an ear, nose and throat specialist or a neurologist.[80]
- Arrange ongoing management of BPPV; this can be done on an outpatient basis.

Case study

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

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

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

† http://members.physiotherapy.asn.au

‡ http://www.dizzyday.com/avesta.html

4.7 Medications

Recommendations

Intervention

- Older people admitted to hospital should have their medications (prescribed and nonprescribed) reviewed and modified appropriately (and particularly in cases of multiple drug use) as a component of a multifactorial approach to reducing the risk of falls in a hospital setting. (Level I)[5]
- As part of a multifactorial intervention, patients on psychoactive medication should have their medication reviewed and, where possible, discontinued gradually to minimise side effects and to reduce their risk of falling. (Level II-*)[7,101]

4.7.1 Assessing medications

Medication use is associated with falls in older people. Therefore, medication review should be a core part of the assessment of an older person in hospital.

Appropriateness of medication should be reviewed routinely in all hospitalised older people. Each hospital should take a proactive organisational approach to medication review, which should include the following:

- reviewing the patient's medications on admission to, and discharge from, hospital[16,102-104]
- reviewing medication charts regularly during the patient's stay in hospital (because medical conditions can change quickly in the hospital setting).[102]

Given that changes are often made to a patient's medication during a hospital stay, it is important to ensure that all changes made are conveyed to the local prescribing practitioner. A home medicines review may also be suggested where substantial changes have been made to medications or where there are concerns about adherence following discharge.

Older people who live in the community are eligible for a home medicines review, which is a service that encourages collaboration between the older person, their general practitioner and their pharmacist to review medication use. The home medicines review is available following a referral from a general practitioner; see the Pharmacy Guild of Australia website.†

† http://www.guild.org.au/mmr/content.asp?id=421

4.7.2 Providing in-hospital interventions

The following interventions can be used as part of a multifactorial falls risk prevention program:

- Withdraw psychoactive medication gradually and under supervision to prevent falls significantly.[101] The National Prescribing Service has guidelines on withdrawing benzodiazepines.†
- Limit multiple drug use to reduce side effects and interactions and the tendency towards proliferation of medication use.[7]
- If centrally acting medications such as benzodiazepines are prescribed, increase surveillance and support mechanisms for older people during the first few weeks of taking these drugs, because the risk of falling is greatest during this period.[105]
- Drugs that act on the central nervous system, especially psychoactive drugs, are associated with an increased risk of falls; therefore, they should be used with caution and only after weighing up their risks and benefits.[106]

In addition, the following strategies help to ensure quality use of medicines, and are good practice for minimising falls in older people in the hospital setting:

- Prescribe the lowest effective dosage of a medication specific to the symptoms.
- Provide support and reassurance to patients who are gradually stopping the use of psychoactive medication(s).
- If the patient needs to take medications known to be implicated in increasing the risk of falls, try to minimise the adverse effects (drowsiness, dizziness, confusion and gait disturbance).
- Provide the patient (and their carer) with an explanation of newly prescribed medications or changes to prescriptions.
- Avoid initiating psychoactive medications in an older person while they are in hospital. Alternative approaches (eg behavioural and psychosocial treatments) to manage sleep disorders, anxiety and depression should be tried before pharmacological treatment. This may avoid the longer term problems associated with side effects and difficulties with withdrawal from the medications.
- Educate the whole multidisciplinary team, patients and their carers to improve their awareness of the medications associated with an increased risk of falls.

† http://www.nps.org.au/__data/assets/pdf_file/0004/16915/ppr04.pdf

- Document information when implementing, evaluating, intervening in, reviewing, educating and making recommendations about the patient's medication use.

4.7.3 Providing post-hospital interventions

Patients who have complex medication regimes should be considered for a home medications review when they are discharged from hospital.

Case study

Mrs C is a 90-year-old woman who was admitted to hospital after falling at home and fracturing her hip. During admission, hospital staff reviewed Mrs C's medications, and noticed that she had been taking a benzodiazepine for a number of years. After discussion with Mrs C, the health care team agreed that a withdrawal program be instituted. By the time Mrs C had undergone a period of inpatient rehabilitation, she had managed to successfully stop her benzodiazepine. Because of her recent hip fracture, she was also started on calcium, vitamin D and a bisphosphonate while in hospital. The cessation of the benzodiazepine was communicated to the general practitioner on Mrs C's discharge from hospital.

4.8 Vision

Recommendations

Assessment

- Use hospitalisation as an opportunity to screen systematically for visual problems that can have an effect both in the hospital setting and after discharge.
- For a rough estimate of the patient's visual function, assess their ability to read a standard eye chart (eg a Snellen chart) or to recognise an everyday object (eg pen, key, watch) from a distance of two metres.

Intervention

- As part of a multidisciplinary intervention for reducing falls in hospitals, provide adequate lighting, contrast and other environmental factors to help maximise visual clues; for example, prevent falls by using luminous commode seats, luminous toilet signs and night sensor lights. (Level III-3)[61]
- Where a previously undiagnosed visual problem is identified, refer the patient to an optometrist, orthoptist or ophthalmologist for further evaluation (this also forms part of discharge planning). (Level II)[7]

- When correcting other visual impairment (eg prescription of new glasses), explain to the patient and their carers that extra care is needed while the patient gets used to the new visual information. (Level II-*)[107]
- Advise patients with a history of falls or an increased risk of falls to avoid bifocals or multifocals and to use single-lens distance glasses when walking – especially when negotiating steps or walking in unfamiliar surroundings. (Level III-2-*)[108]
- As part of good discharge planning, make sure that older people with cataracts have cataract surgery as soon as practicable. (Level II-*)[109,110]

Note: there have not been enough studies to form strong, evidence based recommendations about correcting visual impairment to prevent falls in any setting (community, hospital, residential aged care facility), particularly when used as single interventions. However, considerable research has linked falls with visual impairment in the community setting, and these results may also apply to the hospital setting.

Good practice points

- If a patient uses spectacles, make sure that they wear them, and that they are clean (use a soft, clean cloth), unscratched and fitted correctly. If the patient has a pair of glasses for reading and a pair for distance, make sure they are labelled accordingly, and that they wear distance glasses when mobilising.
- Encourage patients with impaired vision to seek help when moving away from their immediate bed surrounds.

4.8.1 Screening vision

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

Methods of screening vision include the following:

- Visual function can be screened as part of the STRATIFY tool: 'Is the patient visually impaired to the extent that everyday function is affected?'[111]
- A randomised controlled trial of falls risk factor prevention included a vision test as part of a multifactorial intervention. The trial concluded that vision could be tested in a quick and simple way, by checking a patient's ability to recognise an everyday object (eg a pen, key or watch) from a distance of two metres.[7] However, this test will only pick up major vision problems.

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

- Ask the patient about their vision and record any visual complaints and history of eye problems and eye disease.
- Check for signs of visual deterioration. These can include an inability to see detail in objects, read (including avoiding reading) or watch television; a propensity to spill drinks; or a propensity to bump into objects.
- Measure visual acuity or contrast sensitivity quantitatively using a standard eye chart (eg a Snellen eye chart) or the Melbourne Edge Test, respectively (see Table 4.3).
- Check for signs of visual field loss using a confrontation test (see Table 4.3) and refer for a full automated perimetry test by an optometrist or ophthalmologist if any defects are found. Large prospective studies found that an increase in falls occurred when there was a loss of field sensitivity, rather than loss of visual acuity and contrast sensitivity.[112]

Table 4.3 summarises the characteristics of eye-screening tests.

Table 4.3 Characteristics of eye-screening tests

Snellen eye chart (for testing visual acuity)	
Description	Standardised eye test of visual acuity. Comprises a series of symbols (usually letters) in lines of gradually decreasing sizes. 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). Visual acuity is stated as a fraction, with 6 being the numerator and the last line read the denominator (the larger the denominator, the worse the visual acuity). Pocket versions of Snellen charts are available for a clinical screen of visual acuity (these smaller charts can be used at a shorter distance than the standard 6 metres to test visual acuity).
Time needed	5 minutes
Criterion	A score of 6/12 indicates visual impairment; however, this depends on the age of the person (the cut-off score will decrease with increasing age).

Melbourne Edge Test (for testing contrast sensitivity)[37]	
Description	The Melbourne Edge Test presents 20 circular patches containing edges with reducing contrast. Correct identification of the orientation of the edges on the patches provides a measure of contrast sensitivity in decibel units, where dB = $-10\log_{10}$ contrast, where contrast defines the ratio of luminance levels of the two halves of the circular patch.
Time needed	5 minutes
Criterion	A score of less than 18/24 indicates visual impairment; however, the results are age dependent.[113]
Confrontation Visual Field Test[114]	
Description	Crude test of visual fields. Participant and examiner sit between 66 cm and 1 m 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 either side of the vertical, and each with either 1 or 2 fingers extended, and asks the participant, 'What is the total number of fingers I am holding up?' The procedure is repeated for the lower half of the field but changing the number of fingers extended in each hand. The procedure is repeated for the left eye. If the participant incorrectly counts the number of fingers in the upper or lower field, the test should be repeated and then recorded. If the participant moves fixation to view the peripheral targets, repeat the presentation. Results are recorded as finger counting fields R√ and L√ if the patient correctly reports the number of fingers presented. For those who fail this screening, a diagram should be drawn to indicate the part of the field in which the participant made an error.

Time needed	4 minutes
Criterion	If the participant incorrectly reports the number of fingers held up in either eye, they should be referred for a full visual fields test.

If more detailed visual assessment is needed once the patient has been assessed using the crude visual screening methods described above, or if the patient scores poorly on these tests, hospital staff should refer them to an optometrist, orthoptist or ophthalmologist for a full vision assessment.

4.8.2 Providing vision interventions

The following interventions should be applied:

- Make sure that patients have their prescription spectacles with them in hospital.[7]
- Where a previously undiagnosed visual problem is identified, refer the patient to an optometrist or ophthalmologist for further evaluation.[7]
- Provide adequate lighting, contrast and other environmental factors to help maximise visual cues.[61]

Additionally, make sure that if the person wears spectacles, they are clean, in good repair, and fitted properly. Encourage people with impaired vision to seek help when moving away from their immediate bed surrounds.

4.8.3 Discharge planning

If an undiagnosed visual problem is detected, encourage the patient to see an eye specialist when they are discharged from hospital. Healey et al (2004) suggested referral to an optometrist if the patient has lost their glasses, and to an ophthalmologist if there is no known reason for poor vision.[7]

When a visual deficit is identified, the health care team should seek a diagnosis and offer an intervention. Several visual improvement interventions should be considered after discharge from the hospital:

- *Expedited cataract surgery.* This is the only evidence based intervention to date that has been shown to be effective in reducing both falls and fractures in older people.[109,110]

- *Occupational therapy interventions* in people with moderate to severe visual impairment, to manage the function and safety aspects of visual impairment. Home safety should be assessed by an occupational therapist to identify potential hazards, lack of equipment, and risky behaviour that might lead to falls. Interventions that help to maximise visual cues and reduce visual hazards should also be used. These include providing adequate lighting and contrast (eg painting white strips along the edges of stairs and pathways).[115,116]
- *Prescription of optimal spectacle correction, with caution.* Make sure the patient's prescription is correct, and refer them to an optometrist if necessary. However, caution is required in frail older people: a randomised controlled trial found that comprehensive vision assessment with appropriate treatment does not reduce — and may even increase — the risk of falls.[107] The authors speculated that large changes in visual correction may have increased the risk of falls, and that more time may be needed to adapt to updated prescriptions or new glasses.
- *Advice on the most appropriate type of spectacle correction.* Wearing bifocal or multifocal spectacle lenses when walking outside the home and on stairs has been associated with increased falls in older people who live in the community, doubling the risk of falls.[108] These results may also apply to older people in a hospital setting. The health care team should advise people with a history of falls or identified increased falls risk to use single-vision spectacles (instead of bifocals or multifocals) when walking, especially when negotiating steps or moving about in unfamiliar surroundings. A recent study also suggested telling older people who wear multifocals and distance single-vision spectacles to flex their heads rather than just lowering their eyes to look downwards to avoid postural instability.[117]
- *Education.* Educating health care workers on how to manage people with reduced visual function may help to reduce the risk of falls.

Point of interest: mobility training

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

† http://www.visionaustralia.org.au

Case study

Mrs J is a 75-year-old hospital inpatient who fell while walking over a step in a doorway. On admission to the ward, Mrs J was assessed by an ophthalmologist, who found that Mrs J had severe visual impairment caused by macular degeneration. Hospital staff inspected Mrs J's spectacles for scratches, and made sure that they were clean and fitted her correctly. Staff also made sure that there was adequate lighting in her room at all times. Mrs J was given clear instructions about how to move around and was encouraged to call for help when walking in unfamiliar surroundings. On discharge, she was advised to have a full eye examination to ensure optimal spectacle correction. Given her severe visual impairment, Mrs J was also referred for an occupational therapy home assessment.

4.9 Environmental considerations

Recommendations

Assessment

- Regular environmental reviews are advisable; procedures should be in place to document environmental causes of falls; and staff should be educated in environmental risk factors for falls in hospitals.

Intervention

- Environmental modifications should be included as part of a multifactorial intervention. (Level II)[7,8]
- As part of a multifactorial intervention, falls can be reduced by using luminous toilet signs and night sensor lights. (Level III-3)[61]

Good practice points

- Make sure that the patient's personal belongings and equipment are easy and safe for them to access.
- Check all aspects of the environment and modify as necessary to reduce the risk of falls (eg furniture, lighting, floor surfaces, clutter and spills, and mobilisation aids).
- Conduct environmental reviews regularly (consider combining them with occupational health and safety reviews).

4.9.1 Targeting environmental interventions

Environmental review and modification refers to checking the older person's environment for hazards that might cause them to fall, and then modifying or rearranging the environment to remove or minimise these hazards.

Environmental modification interventions are most likely to be effective in people who already have an increased risk of falls.[118] Various tools are available for screening older people for falls risk in hospitals.

4.9.2 Designing multifactorial interventions

As mentioned earlier, there are not enough data to make recommendations about single interventions used alone to prevent falls and injuries in hospitals. However, multifactorial interventions should incorporate environmental modifications, such as:[119-123]

- ensuring chairs and beds are at the correct height (ie when the patient's feet are flat on the ground, their hips are slightly higher than their knees)
- installing even lighting at stairs, and way-finding night lighting to the toilet; making sure night lighting is used consistently and safely
- installing slip-resistant floor surfaces
- cleaning spills and urine promptly
- reducing clutter and other trip hazards in patients' rooms and wards
- providing and repairing walking aids
- providing stable furniture for handhold distances between furniture, beds, chairs and toilets
- ensuring bed, wheelchair and commode brakes are on when a patient is transferring
- using a flooring pattern that does not create an illusion of slope or steps for patients with impaired eyesight or cognitive impairment
- making sure the patient wears safe footwear and avoids ill-fitting footwear with slippery soles
- moving patients who have a high risk of falling closer to the nurses' station
- reducing the unnecessary use of physical restraints, and reviewing the use of restraints regularly
- using electronic warning devices.

4.9.3 Incorporating capital works planning and design

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

- Safety and practicality are just as important as aesthetics.
- Facilities should conform to legislated safety requirements.[123,124]
- A design that allows observation or surveillance of people is important for safety.[124]
- Lighting and handrails at steps and stairs, and design of stairs to allow safer descent are important.[123]
- Slip-resistant flooring or products should be used in all wet areas.[123]
- Impact-absorbent flooring (or underlay) should be used.

4.9.4 Providing storage and equipment

The risk of falls needs to be considered when new equipment is acquired, or when equipment arrangements are being designed or modified (eg new seating or shower chairs).[124] Health professionals and hospital staff should be involved in decisions about buying equipment.

Clutter should be reduced by providing adequate storage space for equipment,[124] and equipment should be reviewed at least monthly.[68]

4.9.5 Conducting environmental reviews

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

- Make modifications based on the findings of the review.
- Prioritise reviews by considering the following environments
  - high-risk environments (bedrooms, dining areas, bathrooms and toilets)
  - environments identified through incident monitoring, hazard identification or near-miss reporting
  - environments identified through environmental checklists.
- Include external environments in environmental reviewing.[124]
- Consider how environmental reviews may fit in with existing workplace health and safety reviews.
- Involve a range of disciplines in environmental reviews and interventions, including health professionals such as occupational therapists, workplace health and safety personnel, infection-control staff,[124] staff working in that particular environment, specialists in geriatric assessment or ergonomics, technical advisers, and older people's carers, where appropriate.
- Ensure a mechanism is in place for reporting environmental hazards.

When considering environmental change, hospital staff should explore a range of products, equipment and solutions. Keep in mind that changing a person's environment could have a negative impact. For example, reorganising furniture may be contraindicated for people who are visually impaired or have dementia.

4.9.6 Orientating new residents

Many falls occur during a person's first few days in a new setting.[125] Therefore, hospital staff should help older people to become familiar with new environments and teach them to use equipment.[126] This orientation could include teaching the patient to transfer themselves between furniture or equipment that they are unfamiliar with.

Case study

Mr B has been hospitalised in a subacute rehabilitation ward following a recent stroke. He has regained most movement; however, he finds it difficult to get out of bed and into his armchair, and to go to the toilet. His geriatrician undertook a medical review, and occupational therapy staff assessed his activities of daily living. His chair and bed height were adjusted; his family replaced his slippers with safer footwear; and LED night lights were provided in the toilet and as a way-finding guide to the bathroom. The staff were instructed on how to best help him with transfers, given his condition. Mr B now attends regular group sessions with the physiotherapist. As a result of this process, Mr B is now safer in his activities of daily living and has a lower risk of falling.

4.10 Individual surveillance and observation

Recommendations

Intervention

- Include individual observation and surveillance as components of a multifactorial falls prevention program, but take care not to infringe on people's privacy. (Level III-2)[61]
- Falls risk alert cards and symbols can be used to flag high-risk patients as part of a multifactorial falls prevention program, as long as they are followed up with appropriate interventions. (Level II)[9]
- Consider using a volunteer sitter program for patients who have a high risk of falling, and define the volunteer roles clearly. (Level IV)[127,128]

Good practice points

- Most falls in hospitals are unwitnessed. Therefore, the key to reducing falls is to raise awareness among staff of the patient's individual risk factors, and reasons why improved surveillance may reduce the risk of falling.
- If appropriate, hospital staff should discuss with carers, family or friends the patient's risk of falling and their need for close monitoring.
- Family members or carers can be given an information brochure to use in discussions with the patient about falls in hospitals.
- Encourage family members or carers to spend time sitting with the patient, particularly in waking hours, and encourage them to notify staff if the patient requires assistance.
- A range of alarm systems and alert devices are available, including motion sensors, video surveillance and pressure sensors. They should be tested for suitability before purchase, and appropriate training and response mechanisms should be offered to staff. Alternatively, find another hospital that already has an effective alarm system, see what their program includes, and try their system.
- Patients who have a high risk of falling should be checked regularly.
- A staff member should stay with patients with cognitive impairment and a high risk of falls while the patient is in the bathroom.

4.10.1 Choosing an approach to observation and surveillance

The following general principles of observation and surveillance represent expert opinion of best practice in the hospital setting, in the absence of trials testing their effectiveness.

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

An important strategy to consider for improving surveillance is to review staff practices, such as staff handover practices and timing of tea and lunch breaks, to ensure that adequate supervision is available when required. Personal preference for the frequency of showers or personal hygiene needs to be considered on an individual basis and balanced against existing routines in the hospital.[61]

Where possible, high-visibility beds or rooms (such as near nurses' stations) should be allocated to those people who require more attention and supervision, including people who have a high risk of falling.[129]

4.10.2 Using flagging

People who have a high risk of falling should be told about their risk. In hospitals, the patient's risk of falling should be identified ('flagged') in a way that considers the person's privacy, yet is recognised easily by staff and the person's family and carers. A range of methods other than verbal and written communication may be used to ensure ongoing communication of high-risk status (flagging), including:

- coloured stickers or markers (positioned on case notes, walking aids, bed heads)[130]
- signs, pictures or graphics on or near the bed head.[9,130]

Flagging reminds staff that a person has a high risk of falling, and should trigger interventions that may prevent a fall. These interventions must be available; otherwise, the flagging may not be beneficial. Flagging may also improve a person's own awareness of their potential to fall.[104]

4.10.3 Using colours for stickers and bedside notices

Green and orange are used frequently for stickers and bedside notices to signify high risk of falling. Although some falls prevention studies have used 'high-risk' alert stickers, the results are conflicting. In the absence of data to the contrary, it may be beneficial for staff to flag high-risk patients, using colours or symbols consistently. Ongoing staff education about the purpose and importance of flagging is essential.

Ideally, in the hospital setting, older people who have a high risk of falling should be checked regularly and offered assistance.[17] A staff member should remain with the high-risk person while they are in the bathroom.[17]

4.10.4 Using sitter programs

Some hospitals have introduced sitter programs. These programs use volunteers, families or paid staff to sit with older people who have a high risk of falling.[131] A limitation of volunteer sitters is that they are typically only available in 'business' hours.[128] Providing 24/7 surveillance coverage by volunteers would require an additional 15 volunteers per week in a hospital ward.[132]

4.10.5 Using response systems

Response systems are usually a form of monitor, incorporating an alarm that sounds when a person moves. A number of response systems are commercially available. In some systems, an alarm is activated by a pressure sensor when a person starts to move from a bed or chair. In other alarm systems, an alarm sounds when any part of a person's body moves within a space monitored by the alarm. Yet another style of alarm activates when a person falls but does not get up.

Alarms may perceivably pose risk-management problems for hospitals, in that failure to respond to an alarm because of lack of staffing could be seen as a failure in care. Moreover, it is not necessarily correct to assume that if someone lacks mental capacity due to dementia, they should be subjected to intrusive surveillance to prevent falls.[133] Care should be taken that alarms do not infringe autonomy. The lack of clear research results (probably due to the difficulties in researching this area), and the ethical and legal considerations of monitoring people should be factored into decisions.

Case study

Mr P is 81-years-old and normally lives alone at home. He was admitted to the medical ward because he was malnourished, dehydrated and falling over on a weekly basis. He was delirious on admission and wandered frequently out of the ward and into other patients' rooms, sometimes getting into the wrong bed. Medical assessment indicated the presence of an acute delirium, and appropriate medical and nursing management was instituted. He became quite agitated if made to sit by his bed and remain in the ward all day. Staff decided to place a chair near the nurses' station for him to sit on when he wanted. The physiotherapist assessed his mobility and arranged for family and available staff to take Mr P for a walk outside when possible. Hospital volunteers, trained in the facility's patient sitter program, were also recruited to sit with Mr P and alert staff if he attempted to walk without supervision. As the delirium settled with medical and nursing management, Mr P became safer with his mobility and orientation, and the observation strategies were gradually withdrawn.

4.11 Restraints

Recommendations

Assessment

- Causes of agitation, wandering and other behaviours should be investigated, and reversible causes of these behaviours (eg delirium) should be treated, before restraint use is considered.

Note: there is no evidence that physical restraints reduce the incidence of falls or serious injuries in older people.[134-137] However, there is evidence that they can cause death, injury or infringement of autonomy.[138,139] Therefore, restraints should be considered the last option for patients who are at risk of falling.[140]

Good practice points

- The focus of caring for patients with behavioural issues should be on responding to the patient's behaviour and understanding its cause, rather than attempting to control it.
- All alternatives to restraint should be considered and trialled for patients with cognitive impairment, including delirium.
- If all alternatives are exhausted, the rationale for using restraints must be documented and an anticipated duration agreed on by the health care team.
- If drugs are used specifically to restrain a patient, the minimal dose should be used and the patient should be reviewed and monitored to ensure their safety. Importantly, chemical restraint must not be a substitute for quality care. See the alternative methods of restraint outlined in this chapter.
- Follow hospital protocol if physical restraints must be used.
- Any restraint use should not only be agreed on by the health team, but also discussed with family or carers.

4.11.1 Assessing the need for restraints and considering alternatives

Hospitals should have clear policies and procedures on the use of restraints, in line with state or territory legislation and guidelines. Causes of agitation, wandering or other behaviours should be investigated, and reversible causes of these behaviours (eg delirium) should be treated before restraint use is considered.[12,141] Restraints should not be used at all for patients who can walk safely and who wander or disturb other patients.[104]

Wandering behaviour warrants urgent exploration of other management strategies, including behavioural and environmental alternatives to restraint use. These alternatives may include:[142]

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

Hospital staff should be provided with appropriate and adequate education about alternatives to restraints. Education can reduce the perceived need to use restraints, as well as minimise the risk of injury when restraints are used.

4.11.2 Using restraints

When the patient's health care team has considered all alternatives to restraints, and agreed that the alternatives are inappropriate or ineffective, restraints could be considered. In such cases, restraints should only be used temporarily to:

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

The health care team must also take into account the rights and wishes of the patient, their carers and family.[12] Any decision to use restraints should be made by discussing their use and possible alternatives with the patient, their carers and family.

When the use of restraints is unavoidable, the type of restraint chosen should always be the least restrictive to achieve the desired outcome. Furthermore, restraint use should be monitored and evaluated continually. Restraints should not be a substitution for supervision, or used to compensate for inadequate staffing or lack of equipment,[14,142] and they should not be applied without the support of a written order.[142]

The minimum standard of documentation for restraint use includes:[140]

- date and time of application
- name of the person ordering the restraint
- type of restraint
- reasons for the restraint
- alternatives considered and trialled
- discussion with the patient, carers or substitute decision makers
- any restrictions on the circumstances in which the restraint may be applied
- intervals at which the patient must be observed
- any special measures necessary to ensure the patient's proper treatment while the restraint is applied
- duration of the restraint.

Case study

Mr M is 70-years-old and was recently admitted to hospital for a routine hernia operation. He had no history of confusion but had recently fallen a number of times at home and suffered minor injuries. Immediately after the operation, Mr M became very confused, agitated and restless. He tried several times to get out of bed. Medical review indicated acute delirium, and medical management was instituted to address the cause. Given Mr M's current lack of awareness of his potential high risk of falling, he was allocated a bed in an area of high supervision and checked more frequently by nursing staff, and his family was contacted and asked to help by sitting with him. The family preferred this option rather than using restraints, when Mr M's cognitive impairment and risk of falling were explained to them.

5 Minimising injuries from falls

5.1 Hip protectors

Recommendations

Assessment

- When assessing a patient's need for hip protectors in hospital, staff should consider the patient's recent falls history, age, mobility and steadiness of gait, disability status, and whether they have osteoporosis or a low body mass index.
- Assessing the patient's cognition and independence in daily living skills (eg dexterity in dressing) may also help determine whether the patient will be able to use hip protectors.

Intervention

- Hip protectors must be worn correctly for any protective effect, and the hospital should introduce education and training for staff in the correct application of hip protectors. (Level II-*)[143]
- When using hip protectors as part of a falls prevention strategy, hospital staff should check regularly that the patient is wearing their protectors, and ensure that the hip protectors are comfortable and the patient can put them on easily. (Level I-*)[144]

Good practice points

- Although there is no evidence of the effectiveness of hip protectors in the hospital setting, their use can be considered in individual cases where the patient is able to tolerate wearing them, and has a high risk of injurious falls.
- If hip protectors are to be used, they must be fitted correctly and worn at all times.
- The use of hip protectors in hospitals is challenging but feasible in subacute wards. In hospital wards where patients are acutely ill (acute wards), effective use of hip protectors has not been shown to be possible.
- Hip protectors are a personal garment and should not be shared between patients.

5.1.1 Assessing the use of hip protectors

Hip protectors are one approach to reducing the risk of hip fracture. They come in various styles, and are designed to absorb or disperse forces on the hip if a person falls onto their hip area. Hip protectors consist of undergarments with protective material inserted over the hip regions. There are three types of hip protectors:

- Soft hip protectors are made from a soft material.
- Hard hip protectors consist of a firm, curved shell, sewn or slipped into a pocket in a lycra undergarment, similar to underpants or bike pants.
- Adhesive hip protectors are stuck directly to the skin of the wearer.

Because of the diversity of older people, service settings and climates, older people in hospitals should have a choice of types and sizes of hip protectors. Soft, energy-absorbing shields are often reported as more comfortable for wearing in bed. A choice of underwear styles and materials means that problems with hot weather, discomfort and appearance can be addressed.

When assessing a patient's need for hip protectors, hospital staff should consider the patient's recent history of falls, their age, their mobility, whether they have a disability, whether they are unsteady on their feet, and whether they have osteoporosis or osteomalacia. Assessing the person's cognition and independence in daily living skills (eg dexterity in dressing) may also help determine whether they will be able to use hip protectors. Hospital staff can use a falls risk assessment tool to help decide whether someone has a high risk of falling and therefore may be considered for the use of hip protectors.

5.1.2 Using hip protectors at night

Older people's risk of falling can increase during the evening and night. Therefore, people who have a high risk of falling, or osteoporosis, or a history of falling at night, may benefit from wearing hip protectors when they go to bed. The soft pads are relatively comfortable when correctly positioned, and can be worn more easily in bed than the hard shell protectors because they are less obtrusive.[104]

5.1.3 Assessing the cost of hip protectors

Cost of hip protectors appears to be a factor influencing uptake, particularly where they are supplied by the facility. Reimbursement by private health funds or by appliance supply schemes may improve this problem. It is unclear to what degree cost affects adherence with longer term use of hip protectors.

5.1.4 Training in hip protector use

Fitting and managing hip protectors are often the responsibilities of a particular member of the health team. Nurses and other care staff are in a key position to encourage adherence with use of hip protectors, because they often help frail older people with dressing, bathing and toileting. Nurses and other care staff should have education and support in developing strategies to encourage adherence with, and correct application of, hip protectors.

Training the individual wearer may improve adherence, by addressing any barriers that the person sees in wearing hip protectors and providing precise instructions and demonstration on how to wear them.

Before the patient starts wearing hip protectors, health care staff and carers should discuss arrangements for cleaning the hip protectors. Washing in domestic washing machines and dryers is feasible, but some hip protectors will not withstand commercial laundering. Although self-adhesive hip protectors may be appealing in some respects (eg the patient can use their own undergarments), it is unclear whether they can be safely used in the long term.

Case study

Mrs J was hospitalised after a fall in which she sustained a fractured pelvis. In the rehabilitation ward, she agreed to use hip protectors. The ward nurses showed her how to use the hip protectors and encouraged their use in hospital. She continued to wear them at home after discharge from hospital. Mrs J's adherence with use of the hip protectors was checked when she attended the clinic for a follow-up visit. While watering her garden, Mrs J fell onto the hip protectors. It is likely that a fracture was prevented as she had a bruise on her upper thigh under the hip protector.

5.2 Vitamin D and calcium supplementation

Recommendations

Assessment

- To screen for possible vitamin D deficiency, dieticians, nutritionists or health professionals can collect information on the patient's eating habits, food preferences, meal patterns, food intake and sunlight exposure. Alternatively, a blood sample can be taken.

Intervention

- Vitamin D and calcium supplementation should be recommended as an intervention strategy to prevent falls in older people. Benefits from supplementation are most likely to be seen in patients who have vitamin D insufficiency (25(OH)D of <50 nmol/L) or deficiency (25(OH)D of <25 nmol/L), comply with the medication, and respond biochemically to supplementation. (Level I-*)[5]

Note: it is unlikely that benefits from vitamin D and calcium supplementation will be seen in hospital (particularly in acute care or short stays), but there is evidence both from the community and residential aged care settings to support dietary supplementation, particularly in patients who are deficient in vitamin D.

Good practice points

- Hospitalisation of an older person provides an opportunity for comprehensive health care assessment and intervention. There is no direct evidence to suggest that calcium and vitamin D supplementation will prevent falls in hospital; however, because most older people will return home or to their residential aged care facility, hospitalisation should be viewed as an opportunity to identify and address falls risk factors, including adequacy of calcium and vitamin D. This information should be included in discharge recommendations.
- As part of discharge planning, any introduction of vitamin D and calcium supplementation should be conveyed to the person's general practitioner or health practitioner.

5.2.1 Assessing vitamin D adequacy

Low vitamin D levels have been associated with reduced bone mineral density, high bone turnover and increased risk of hip fracture.[145] Furthermore, vitamin D may prevent falls by improving muscle strength and psychomotor performance, independently of any other role in maintaining bone mineral density.[146,147]

Dieticians, nutrition and dietetic support staff, or nursing and medical staff, can collect information on eating habits, food preferences, meal patterns, food intake and sunlight exposure. To do this, they can use:

- food preference records
- food and fluid intake records
- 25-hydroxyvitamin D (25(OH)D) blood levels.

5.2.2 Ensuring minimum sun exposure to prevent vitamin D deficiency

Osteoporosis Australia (in association with the Cancer Council Australia) recommends that, for most older Australians, vitamin D deficiency can be prevented by 5–15 minutes exposure of the face and upper limbs to sunlight four to six times each week, although deliberate exposure to sunlight between 10 am and 3 pm in the summer months for more than 15 minutes is not advised.

If this modest sunlight exposure is not possible, a vitamin D supplement of at least 800 IU per day is recommended.

5.2.3 Assessing the need for vitamin D and calcium supplementation

Hospitalisation of an older person provides an opportunity for comprehensive health care assessment and intervention. There is no direct evidence to suggest that calcium and vitamin D supplementation will prevent falls in hospital; however, because most older people will return home or to their residential aged care facility, hospitalisation should be viewed as an opportunity to identify and address falls risk factors, including adequacy of calcium and vitamin D.

For confirmed cases of vitamin D deficiency, supplementation with 3000–5000 IU per day for at least one month is required to replenish body stores. Increased availability of larger dose preparations of cholecalciferol (vitamin D3) would be a useful therapy in the case of severe deficiencies.[145,148,149]

For most older adults in long-term care in Australia, it is appropriate to supplement with 1000 IU vitamin D without measuring 25(OH)D blood levels. This is based on the prevalence of deficiency, and the low risk and benefit of supplementing with vitamin D in this untargeted way to prevent hip fractures.[145,150,151]

5.2.4 *Encouraging patients to include high-calcium foods in their diet*

Appendix 11 of the Falls Guidelines outlines calcium and vitamin dietary suggestions and hints, and is useful for encouraging people to include more calcium in their diet.[152] Referral to a dietician may be appropriate if a person is having trouble consuming adequate calcium, has lactose intolerance, does not include calcium as a normal part of their diet (culturally) or does not consume dairy foods (eg they follow a vegan diet).

5.2.5 *Discouraging patients from consuming foods that prevent calcium absorption*

Oral calcium intake needs to meet the recommended daily intake. Patients should be discouraged from consuming too many foodstuffs that lower or prevent calcium absorption (eg caffeine, soft drinks containing phosphoric acid). Instead, they should be encouraged to include foods high in calcium in their diet.

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.[152]

Case study

Mrs F was admitted to hospital following a fall. In keeping with her culture and religious beliefs, she only allows her face, hands and feet to be exposed. Blood tests revealed severe vitamin D deficiency – a vitamin D level of 12 nmol/L. Mrs F's deficiency was initially managed with one month of 3000 IU units of vitamin D each day. This was reduced to 800 IU daily after the initial period of replacement.

Because Mrs F was admitted to hospital after a fall, hospital staff reviewed her medications while she was in hospital, and an occupational therapist undertook a home assessment before she was discharged.

5.3 Osteoporosis management

Recommendations

Assessment

- Patients with a history of recurrent falls should be considered for a bone health check. Also, patients who sustain a minimal-trauma fracture should be assessed for their risk of falls.

Intervention

- People with diagnosed osteoporosis or a history of low-trauma fracture should be offered treatment for which there is evidence of benefit. (Level I)[153]
- Hospitals should establish protocols to increase the rate of osteoporosis treatment in patients who have sustained their first osteoporotic fracture. (Level IV)[154]

Good practice points

- The health care team should consider strategies for minimising unnecessary bedrest (to maintain bone mineral density), protecting bones, improving environmental safety, and vitamin D prescription, and this information should be included in discharge recommendations.
- When using osteoporosis treatments, patients should be co-prescribed vitamin D with calcium.

5.3.1 Screening for osteoporosis

Screening for osteoporosis is important for minimising falls-related injuries. It is important to recognise that people sustaining low-trauma fractures after the age of 60 years probably have osteoporosis and an increased risk of subsequent fracture.[155,156] Bone densitometry and specific antiosteoporosis therapy should be considered in these people. Also, older people with a history of recurrent falls should be considered for a bone health check.

In both cases (recurrent fallers and those sustaining low-trauma fractures), the health care team should consider strategies for optimising function, minimising a long lie on the floor, protecting bones, improving environmental safety and vitamin D prescription.[157,158]

Postmenopausal women who have low bone density, or who have already had one fracture in their spine or wrist, should be treated with a bisphosphonate (such as risedronate) to reduce their risk of further fractures in the spine or hip.[159] Consider using bisphosphonates, strontium or raloxifene to reduce the risk of vertebral fractures and increase bone density in older men at risk of osteoporosis (ie those with a low body mass index). Bisphosphonates work best in people with adequate vitamin D and calcium levels, and should therefore be co-prescribed.

Hospitals should establish protocols to increase the rate of osteoporosis treatment in people who have sustained their first osteoporotic fracture.[154]

Case study

Mrs E, who is 75-years-old, fell and fractured her humerus (upper arm), and was admitted to her local hospital. Specific questioning revealed that she had an early menopause and that she rarely goes outside because of concern about skin cancer. The orthopaedic surgeon treated her fracture. The nurse at the hospital clinic asked the doctor whether the fracture was related to osteoporosis and whether there was some way to reduce the chance of further similar falls and fractures. As a result of their discussion, the surgeon suggested that Mrs E start taking calcium and vitamin D and referred her to the osteoporosis clinic for a weekly bisphosphonate review, a nutritional review, and strength and balance training.

6 Responding to falls

Good practice points

- Hospital staff should report and document all falls.
- It is advisable to ask a patient whether they remember the sensation of falling or whether they think that they blacked out, because many patients who have syncope are amnestic of the fact.
- Staff should follow the hospital protocol or guidelines for managing patients immediately after a fall.
- After the immediate follow-up of a fall, determine how and why a fall may have occurred, and implement actions to reduce the risk of another fall.
- Analysing falls is one of the key ways to prevent future falls. Organisational learning from this analysis can be used to inform practice and policies, and to prevent future falls. A post-fall analysis should lead to an interdisciplinary care plan to reduce the risk of future falls and injuries, and address any identified comorbidities or falls risk factors.
- An in-depth analysis of the fall (eg a root-cause analysis) is required if there has been a serious injury following a fall, or if a death has resulted from a fall.

6.1 Immediate response to falls

The circumstances surrounding a fall are a critical part of care, because a fall may be the first and main indication of another, underlying and treatable problem. Hospital staff should review the circumstances of every patient fall (eg do a root-cause analysis; see Section 6.3) to help plan actions and interventions for preventing future falls.[61] Staff should complete a falls incident report, remembering that some information about the circumstances of a fall may be difficult to collect from the patient themselves and may need to be sourced from staff, visitors or other patients sharing the ward.

Hospitals should have their own falls incident policy, or follow a clinical practice guideline for preventing and responding to falls. The following checklist for hospital staff is a guide to what should be included in a falls incident policy.

Checklist 1: Managing the patient immediately after a fall

Offer basic life support and provide reassurance

- Check for ongoing danger.
- Check whether the patient is responsive (eg responds to verbal or physical stimulus).
- Check the patient's airways, breathing and circulation.
- Reassure and comfort the patient.[14,104]

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 patient has hit their head, or if their fall was unwitnessed, record neurological observations (eg using the Glasgow Coma Scale).[14]

Check for injuries

- Check for signs of injury, including abrasion, contusion, laceration, fracture and head injury.[14,104,160]
- Observe changes in the level of consciousness, headache, amnesia or vomiting.

Move the patient

- Assess whether it is safe to move the patient from their position, and identify any special considerations in moving them. Staff members should use a lifting device rather than trying to lift the person on their own. Follow the hospital's policy or guideline on lifting.[14,161]

Monitor the patient

- Observe patients who have fallen and who are taking anticoagulants or antiplatelets (blood-thinning medications) carefully, because they have an increased risk of bleeding and intercranial haemorrhage. Patients with a history of alcohol abuse may be more prone to bleeding.
- Arrange for ongoing monitoring of the patient, because some injuries may not be apparent at the time of the fall.[104] Make sure that hospital staff know the type, frequency and duration of the observations that are required.

Report the fall

- Report all falls to a medical officer, even if injuries are not apparent.[160] Document all details in the patient's medical record, including their observations, appearance or response; evidence of injury; location of the fall; notification of medical provider; and actions taken.[104,160]
- Complete a falls reporting form according to local policy guidelines for all falls,[14,104,160] regardless of where the fall occurred or whether the patient was injured.
- Note any details of the fall for reference in reporting the fall, including the patient's description of the fall, if possible.[14,160] As a minimum,

this should include the location and time of the fall, what the patient was doing immediately before they fell, the mechanisms of the fall (eg slip, trip, overbalance, dizziness), and whether they lost consciousness or had a conscious collapse.

Discuss the fall and future risk management

- Communicate to all relevant staff, family and carers that the patient has fallen and has an increased risk of falling again.[160] At the earliest opportunity, notify the person nominated to be contacted in case of an emergency.[14,160]
- Discuss the circumstances of the fall, its consequences, and actions planned to reduce future falling risk with the patient and their family.
- Assume that once a patient has fallen, they automatically become at high risk of falling again until they have been assessed.[104]
- Follow local guidelines for identifying patients as being at increased risk of falling.

6.2 Post-fall follow-up

After the fall, determine how and why a fall may have occurred, and implement actions to reduce the risk of another fall. The checklist in the following box is a guide to what should be included in a hospital's falls incident policy or practice guidelines.

Checklist 2: Post-fall follow-up

- Investigate the cause of the fall, including assessing for delirium.
- Review the implementation of existing falls prevention strategies.[104,160]
- Complete a falls risk assessment, because new risk factors may be present.[104,160]
- Implement a targeted, individualised plan for daily care, based on the findings of the falls risk assessment tool. Multifactorial interventions should be carried out, as appropriate. They may include, but are not limited to, gait assessment, balance and exercise programs, footwear review, medication review, hypotension management, increased observation, environmental modification and treatment of cardiovascular disorders.[162] This will often involve referral to other members of the health care team.
- Encourage the patient to resume their normal level of activity, because many older people are apprehensive after a fall, and the fear of falling is a strong predictor of future falls.[163]
- Consider the use of injury-prevention interventions.[104,160]
- Consider investigations for osteoporosis in the presence of low-trauma fractures.
- Ensure effective communication of assessment and management recommendations to everyone involved.[104,160]

6.3 Analysing the fall

A more in-depth analysis of the fall may be required, particularly where there has been a serious injury or adverse outcome for the patient. This is sometimes known as a root-cause analysis. A root-cause analysis is always required if a fall results in serious injury or death. In some jurisdictions, a fall in hospital that results in death must be reported to the state coroner. Each hospital should have a falls review process in place.

6.4 Reporting and recording falls

Accurate reporting of falls will occur only in a culture that is fair and just — that is, a 'no blame culture'. For accurate reporting of falls, the leaders in the health service must promote incident reporting as a part of the improvement process, rather than a punitive tool to identify potential staff negligence, to avoid feelings of guilt or blame.[164]

For high-quality care and risk management, information about falls must be collected and collated to monitor falls incidence, identify falls patterns, identify ways of preventing future falls and provide feedback on the effectiveness of falls prevention programs.[12,14] Feedback should also be provided to staff regularly (eg monthly) so that local trends can be identified at a ward or unit level, and can be addressed as part of the routine continuous quality cycle. Any data collected should be used to inform changes in hospital practice aimed at reducing patient falls rates. The minimum dataset that should be collected includes the following:

- What risk factors for falls and injury were present?
- What was the activity at the time of the incident?
- Has the patient had a falls risk assessment?
- What was the mechanism of the fall?
- What interventions were in place at the time of the fall?
- Was it a confirmed or suspected fall?

Checklist 3 contains a more comprehensive list of data that can be collected, based on the *Queensland Health Falls Prevention Guidelines* (2003) and the Australian Incident Monitoring System.[164]

Checklist 3: Additional data that may form part of falls incident reporting

- What was the type of fall (eg slip, trip, bumping into or falling on an object)?
- What was the activity at the time of the fall (eg attempting to stand, walking)?
- Does the patient depend on a carer, aids or hospital staff?
- If the patient has a high risk of falls, what steps have they taken previously to reduce falls risk and injury risk?
- Is there any relevant information about the patient's clothing, footwear, eyewear and mobility aids used at the time of the fall?
- Were any restraints being used?
- Did the patient have any recent change in medications that might be associated with their falls risk?
- Was there staff supervision at the time of the fall?
- Where there any external factors that may have contributed to the fall, such as environmental conditions (eg floor, lighting, clutter) or staffing levels?
- What was the patient's status after the fall (eg baseline observations, injuries)?
- What interventions will be implemented after the fall, and what medical treatment is required?
- What was the patient's perception of the fall, including their description of any preceding sensations or symptoms, and what do they think might have prevented the fall?
- Were there any witnesses to the fall?
- Are there any other comments?

Information should be completed whenever a fall or near miss occurs in a hospital. If information is already being collected, the hospital's current incident monitoring processes may not need to be altered. Hospitals may need to put processes in place to record falls incidences and outcomes if this information is not collected routinely, and this may be incorporated into existing incident reports.

6.5 Comprehensive assessment following a fall

People who fall repeatedly (eg two or more times per year) and people prone to injurious falls require a comprehensive and detailed assessment.[162] For a more detailed assessment, refer the person to a specialist (eg geriatrician), where possible, or to a falls clinic.

6.6 Loss of confidence after a fall

A common but often overlooked consequence of a fall is the development of a loss of confidence in walking, or a fear of falling,[165] which can occur even in the absence of any injury. In the period after a fall, staff should observe the patient to note any change in usual activity that might indicate the presence of, or an increase in, fear of falling. Discussion with the patient about any concerns about falling might also be an opportunity to identify a fear of falling.

References

1 NHMRC (National Health and Medical Research Council) (1999). *A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines*, Australian Government, Canberra.

2 National Falls Prevention for Older People Initiative (2000). *Step Out With Confidence: A Study into the Information Needs and Perceptions of Older Australians Concerning Falls and their Prevention*, Commonwealth Department of Health and Aged Care, Canberra. http://www.health.gov.au/internet/wcms/publishing.nsf/content/health-pubhlth-strateg-injury-fall-documents.htm

3 NCC-NSC (National Collaborating Centre for Nursing and Supportive Care) (2004). *Clinical Practice Guideline for the Assessment and Prevention of Falls in Older People*. http://www.nice.org.uk/pdf/CG021NICEguideline.pdf (Accessed July 2007).

4 Clemson L, Cumming RG, Kendig H, Swann M, Heard R and Taylor K (2004). The effectiveness of a community-based program for reducing the incidence of falls in the elderly: a randomized trial. *Journal of the American Geriatrics Society* 52(9):1487–1494.

5 Cameron I, Murray G, Gillespie L, Cumming R, Robertson M, Hill K and Kerse N (2008). Interventions for preventing falls in older people in nursing care facilities and hospitals. *Cochrane Database of Systematic Reviews* (3) Art. No.:CD005465. DOI: 10.1002/14651858.CD005465.

6 Oliver D, Connelly J, Victor C, Shaw F, Whitehead A, Genc Y, Vanoli A, Martin F and Gosney M (2007). Strategies to prevent falls and fractures in hospitals and care homes and effect of cognitive impairment: systematic review and meta-analyses. *British Medical Journal* 334(7584):82.

7 Healey F, Monro A, Cockram A, Adams V and Heseltine D (2004). Using targeted risk factor reduction to prevent falls in older in-patients: a randomised controlled trial. *Age and Ageing* 33(4):390–395.

8 Stenvall M, Olofsson B, Lundström M, Englund U, Borssén B, Svensson O, Nyberg L and Gustafson Y (2007). A multidisciplinary, multifactorial intervention program reduces postoperative falls and injuries after femoral neck fracture. *Osteoporosis International* 18(2):167–175.

9 Haines T, Bennell K, Osborne R and Hill K (2004). Effectiveness of targeted falls prevention programme in subacute hospital setting: randomised controlled trial. *British Medical Journal* 328:676.

10 Cumming R, Thomas M, Szonyi G, Salkeld G, O'Neill E, Westbury C and Frampton G (1999). Home visits by an occupational therapist for assessment and modification of environmental hazards: a randomized trial of falls prevention. *Journal of the American Geriatrics Society* 47(12):1397–1402.

11 Clemson L, Mackenzie L, Ballinger C, Close J and Cumming R (2008). Environmental interventions to prevent falls in community-dwelling older people. *Journal of Aging and Health* 20(8):954–971.

12 VQC (Victorian Quality Council) (2004). *Minimising the risk of falls and fall-related injuries. Guidelines for acute, sub-acute and residential care settings*, Department of Human Services Metropolitan Health and Aged Care Services Division, Victorian Government, Melbourne.

13 Falls Injury Prevention Collaborative Education and Resource Working Group (2008). *Queensland How to Stay On Your Feet Checklist*, Queensland Health, Brisbane.

14 CERA (Centre for Education and Research on Ageing) (1998). *Putting Your Best Foot Forward: Preventing and Managing Falls in Aged Care Facilities*, Australian Government, Canberra.

15 Resnick B (2003). Preventing Falls in Acute Care. In: *Geriatric Nursing Protocols for Best Practice*, Mezey M, Fulmer T, Abraham I and Zwicker D (eds), Springer Publishing Company Inc, New York, 141–164.

16 Conforti D (2004). *The Assessment, Management and Prevention of Falls in the Elderly in the South Western Sydney Area Health Service*, South West Sydney Area Health Service, Liverpool, NSW.

17 Szumlas S, Groszek J, Kitt S, Payson C and Stack K (2004). Take a second glance: a novel approach to inpatient fall prevention. *Joint Commission Journal on Quality and Safety* 30(6):295–302.

18 Healey F (2007). *Bedrails – Reviewing the Evidence: A Systematic Literature Review*, National Patient Safety Agency, London.

19 Blackberry I, Galvin P, Bingham A, Hill K, Russell M, Liaw T and Taylor J (2007). *A Literature Review on Falls Prevention for Older People Presenting to Emergency Departments Following a Fall: Effective Approaches and Barriers to Best Practice*, Report by the National Ageing Research Institute (NARI) to the Australian Government Department of Health and Ageing, Melbourne.

20 Hegney D, Buikstra E, Chamberlain C, March J, McKay M, Cope G and Fallon T (2006). Nurse discharge planning in the emergency department: a Toowoomba, Australia study. *Journal of Clinical Nursing* 15(8):1033–1044.

21 NARI (National Ageing and Research Institute) (2007). *Falls Prevention Guideline for the Emergency Department*, Australian Government Department of Health and Ageing, National Ageing Research Institute (NARI), Melbourne.

22 NARI (National Ageing and Research Institute) (2008). *Implementation of an Evidence Based Falls Risk Screening and Assessment for Older People Presenting to Emergency Departments after a fall*, Australian Government Department of Health and Ageing, National Ageing Research Institute (NARI), Melbourne.

23 Hill K, Moore K, Dorevitch M and Day L (2008). Effectiveness of falls clinics: an evaluation of outcomes and client adherence to recommended interventions. *Journal of the American Geriatrics Society* 56(4):600–608.

24 Nordin E, Lindelof N, Rosendahl E, Jensen J and Lundin-Olsson L (2008). Prognostic validity of the Timed Up-and-Go test, a modified Get-Up-and-Go test, staff's global judgement and fall history in evaluating fall risk in residential care facilities. *Age and Ageing* 37(4):442–448.

25 Morse J, Morse R and Tylko S (1989). Development of a scale to identify the falls prone patient. *Canadian Journal of Aging* 8:366–377.

26 Nyberg L and Gustafson L (1996). Using the Downton index to predict those prone to falls in stroke rehabilitation. *Stroke* 27(10):1821–1824.

27 Oliver D, Britton M, Seed P, Martin F and Hopper A (1997). Development and evaluation of evidence based risk assessment tool (STRATIFY) to predict which elderly inpatients will fall: case-control and cohort studies. *British Medical Journal* 315(7115):1049–1053.

28 Papaioannou A, Parkinson W, Cook R, Ferko N, Coker E and Adachi J (2004). Prediction of falls using a risk assessment tool in the acute care setting. *BMC Medicine* 2(1) doi: 10.1186/1741-7015-2-1.

29 Russell M, Hill K, Day L, Blackberry I, Gurrin L and Dharmage S (2009). Development of the Falls Risk for Older People in the Community (FROP-Com) screening tool. *Age and Ageing* 38(1):40–46.

30 Close J, Hooper R, Glucksman E, Jackson S and Swift C (2003). Predictors of falls in a high risk population: results from the prevention of falls in the elderly trial (PROFET). *Emergency Medical Journal* 20(5):421–425.

31 Hill K and Vrantsidis F (2003). *Evaluation of Falls Prevention Projects for Older People in the Acute Hospital Setting*, Report to the Department of Human Services (Victoria), NARI, Melbourne

32 Hill K, Vrantsidis F, Jessup R, McGaan A, Pearce J and Collins T (2004). Validation of a falls risk assessment tool in the sub-acute hospital setting: a pilot study. *Australasian Journal of Podiatric Medicine* 38(4):99–108.

33 Haines T, Bennell KO, R and Hill K (2006). A new instrument for targeting falls prevention interventions was accurate and clinically applicable in a hospital setting. *Journal of Clinical Epidemiology* 59(2):168–175.

34 Evans D, Hodgkinson B, Lambert L and Wood J (2001). Falls risk factors in the hospital setting: a systematic review. *International Journal of Nursing Practice* 7(1):38–45.

35 Oliver D, Daly F, Martin F and McMurdo M (2004). Risk factors and risk assessment tools for falls in hospital in-patients: a systematic review. *Age and Ageing* 33(2):122–130.

36 Scott V, Votova K, Scanlan A and Close J (2007). Multifactorial and functional mobility assessment tools for fall risk among older adults in community, home-support, long-term and acute care setting. *Age and Ageing* 36(2):130–139.

37 Lord S, Menz H and Tiedemann A (2003). A physiological profile approach to falls risk assessment and prevention. *Physical Therapy* 83:237.

38 Duncan P, Studenski S, Chandler J and Prescott B (1992). Functional reach: predictive validity in a sample of elderly male veterans. *Journal of Gerontology* 47:M93–98.

39 de Morton N, Keating J and Jeffs K (2007). Exercise for acutely hospitalised older medical patients. *Cochrane Database of Systematic Reviews* (1) Art. No.: CD005955. DOI: 10.1002/14651858.CD005955.pub2.

40 Tiedemann A, Shimada H, Sherrington C, Murray S and Lord S (2008). The comparative ability of eight functional mobility tests for predicting falls in community-dwelling older people. *Age and Ageing* 37(4):430–435.

41 Robertson M, Gardner M, Devlin N, McGee R and Campbell A (2001). Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 1: Randomised controlled trial. *British Medical Journal* 322:697–701.

42 Haines T, Kuys S, Morrison G, Clarke J and Bew P (2008). Balance impairment not predictive of falls in geriatric rehabilitation wards. *Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 63(5):523–528.

43 Thorbahn L and Newton R (1996). Use of the Berg Balance Test to predict falls in elderly persons. *Physical Therapy* 76(6):576–583.

44 Tinetti M (1986). Performance-oriented assessment of mobility problems in elderly patients. *Journal of the American Geriatrics Society* 34(2):119–126.

45 Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C and Todd C (2005). Development and initial validation of the Falls Efficacy Scale-International (FES-I). *Age and Ageing* 34(6):614–619.

46 Schnelle J, Kapur K, Alessi C, Osterweil D, Beck J, Al-Samarrai N, Ouslander J and Schnelle J (2003). Does an exercise and incontinence intervention save healthcare costs in a nursing home population? *Journal of the American Geriatrics Society* 51(2):161–168.

47 Forster A and Young J (1995). Incidence and consequences of falls due to stroke: a systematic inquiry. *British Medical Journal* 311(6997):83–86.

48 Weber J, Coverdale J and Kunik M (2004). Delirium: current trends in prevention and treatment. *Internal Medicine Journal* 34(3):115–121.

49 Hendrie H (1998). Epidemiology of dementia and Alzheimer's disease. *American Journal of Geriatric Psychiatry* 62(suppl. 1):S3–18.

50 Folstein M, Folstein S and McHugh P (1975). 'Mini-Mental state': a practical method for grading the cognitive status of patients for the clinician. *Journal of Psychiatric Research* 12:189–198.

51 Rowland J, Basic D, Storey J and Conforti D (2006). The Rowland Universal Dementia Assessment Scale (RUDAS) and the Folstein MMSE in a multicultural cohort of elderly persons. *International Psychogeriatrics* 18(1):111–120.

52 Storey J, Rowland J, Basic D, Conforti D and Dickson H (2004). The Rowland Universal Dementia Assessment Scale (RUDAS): a multicultural cognitive assessment scale. *International Psychogeriatrics* 16(1):13–31.

53 Inouye S (1990). Clarifying confusion: the confusion assessment method: a new method for detection of delirium. *Annals of Internal Medicine* 113(12):941–948.

54 Wei L, Fearing M, Sternberg E and Inouye S (2008). The confusion assessment method: a systematic review of current usage. *Journal of the American Geriatrics Society* 56(5):823–830.

55 Shaw F (2007). Prevention of falls in older people with dementia. *Journal of Neural Transmission* 114(10):1259–1264.

56 Cohen-Mansfield J (2001). Nonpharmacologic interventions for inappropriate behaviors in dementia: a review, summary, and critique. *American Journal of Geriatric Psychiatry* 9(4):361–381.

57 Inouye S, van Dyck C, Alessi C, Balkin S, Siegal A and Horwitz R (2006). Delirium in older persons. *New England Journal of Medicine* 354(11):1157–1165.

58 Joanna Briggs Institute (2001). Maintaining oral hydration in older people. *Best Practice* 5:1–5.

59 Keller N (2006). Maintaining oral hydration in older adults living in residential aged care facilities. *International Journal of Evidence Based Healthcare* 4:68–73.

60 Bakarich A, McMillan V and Prosser R (1997). The effect of a nursing intervention on the incidence of older patient falls. *Australian Journal of Advanced Nursing* 15(1):26–31.

61 Fonda D, Cook J, Sandler V and Bailey M (2006). Sustained reduction in serious fall-related injuries in older people in hospital. *Medical Journal of Australia* 184(8):379–382.

62 Mommen S and Foldspang A (1994). Body mass index and adult female urinary incontinence. *World Journal of Urology* 12:319–322.

63 Gluck T, Wientjes H and Rai G (1996). An evaluation of risk factors for in-patient falls in acute and rehabilitation elderly care wards. *Gerontology* 42(2):104–107.

64 Sutton J, Standen P and Wallace A (1994). Unreported accidents to patients in hospital. *Nursing Times* 90(39):46–49.

65 Schmid N (1990). Reducing patient falls: a research-based comprehensive fall prevention program. *Military Medicine* 155(5):202–207.

66 Gardner J and Fonda D (1994). Urinary incontinence in the elderly. *Disability and Rehabilitation* 16(3):140–148.

67 Meade C, Bursell A and Ketelsen L (2006). Effects of nursing rounds on patients' call light use, satisfaction, and safety. *Australian Journal of Nursing* 106(9):58–70.

68 Lord S, Sherrington C and Menz H (2007). *Falls in Older People: Risk Factors and Strategies for Prevention*, Cambridge University Press, New York.

69 Berg W, Alessio H, Mills E and Tong C (2002). Circumstances and consequences of falls in independent community-dwelling older adults. *Age and Ageing* 26(4):261–268.

70 Sherrington C and Menz H (2003). An evaluation of footwear worn at the time of fall-related hip fracture. *Age and Ageing* 32(3):310–314.

71 Menz H and Sherrington C (2000). The footwear assessment form: a reliable clinical tool to assess footwear characteristics of relevance to postural stability in older adults. *Clinical Rehabilitation* 14(6):657.

72 Koepsell T, Wolf M, Buchner D, Kukull W, LaCroix A, Tencer A, Frankenfeld C, Tautvydas M and Larson E (2004). Footwear style and risk of falls in older adults. *Journal of the American Geriatrics Society* 52(9):1495–1501.

73 Richardson J and Hurvitz E (1995). Peripheral neuropathy: a true risk factor for falls. *Journal of Gerontology* 50(4):M211–215.

74 Menz H (2008). *Foot Problems in Older People: Assessment and Management*, Churchill Livingstone/Elsevier, London.

75 Menz H (2009). Assessment of the older person. In: *Merriman's Assessment of the Lower Limb*, Yates B (ed), Churchill Livingstone/Elsevier, London.

76 Kenny R, Richardson D, Steen N, Bexton R, Shanahan M, Shaw F and Bond J (2001). Carotid sinus syndrome: a modifiable risk factor for non-accidental falls in older adults. *Journal of the American Medical Directors Association* 38:1491–1496.

77 Gupta V and Lipsitz L (2007). Orthostatic hypotension in the elderly: diagnosis and treatment. *American Journal of Medicine* 120(10):841–847.

78 Maule S, Papotti C, Nason D, Magnino C, Testa E and Veglio F (2008). Cognitive decline and low blood pressure: the other side of the coin. *Clinical and Experimental Hypertension* 38(8):711–719.

79 Morse J (1996). *Preventing Patient Falls*, Sage Publications, Thousand Oaks, California.

80 Waterston J (2000). Dizziness. *Medical Journal of Australia* 172:506–511.

81 Hamalgyi M and Curthoys I (1988). A sign of canal paresis. *Archives of Neurology* 45:737–739.

82 Schubert M, Tusa R, Grine L and Herdman S (2004). Optimizing the sensitivity of the head thrust test for identifying vestibular hypofunction. *Physical Therapy* 84:151–158.

83 Maarsingh O, Dros J, van Weert H, Schellevis F, Bindels P and van der Horst H (2009). Development of a diagnostic protocol for dizziness in elderly patients in general practice: a Delphi procedure. *BMC Family Practice* 10:1–33.

84 Gordon C, Levite R, Joffe V and Gadoth J (2004). Is posttraumatic benign paroxysmal positional vertigo different from the idiopathic form? *Archives of Neurology* 61:1590–1593.

85 Strupp M, Zingler V, Arbusow V, Niklas D, Maag K, Dieterich M, Bense S, Theil D, Jahn K and Brandt T (2004). Methylprednisolone, valacyclovir, or the combination for vestibular neuritis. *New England Journal of Medicine* 351:354–361.

86 Lalwani A, (ed) (2004). The aging inner ear. In: *Current Diagnosis and Treatment in Otolaryngology – Head and Neck Surgery*, McGraw Hill Professional.

87 Brandt T and Daroff R (1980). Physical therapy for benign paroxysmal positional vertigo. *Archives of Otolaryngology* 106:484–485.

88 Epley J (1992). The canalith repositioning procedure for treatment of benign paroxysmal positional vertigo. *Otolaryngology Head and Neck Surgery* 107:399–404.

89 Woodworth B, Gillespie M, Boyd M and Lambert P (2004). The canalith repositioning procedure for benign positional vertigo: a meta-analysis. *Laryngoscope* 114(7):1143–1146.

90 Lea P, Kushnir M, Shpirer Y, Zomer Y and Flechter S (2005). Approach to benign paroxysmal positional vertigo in old age. *Israeli Medical Association Journal* 7:447–450.

91 Whitney S and Rossi M (2000). Efficacy of vestibular rehabilitation. *Otolayrngology Clinics of North America* 33:659–673.

92 Cohen H (1992). Vestibular rehabilitation reduces functional disability. *Otolaryngology Head and Neck Surgery* 107:638–643.

93 Swan L (2003). Facilitating psychological intervention for a patient with unilateral vestibular hypofunction. *Neurology Report* 27:54–60.

94 Hillier S and Hollahan V (2007). Vestibular rehabilitation for unilateral peripheral vestibular dysfunction. *Cochrane Database of Systematic Reviews* (4) Art. No.: CD005397. DOI: 10.1002/14651858.CD005397.pub2.

95 Herdman S, Clendaniel R, Mattox D, Holliday M and Niparko J (1995). Vestibular adaptation exercises and recovery: acute stage after acoustic neuroma resection. *Otolaryngology Head and Neck Surgery* 113(1):77–87.

96 Mruzek L, Barin K, Nichols D, Burnett C and Welling D (1995). Effects of vestibular rehabilitation and social reinforcement on recovery following ablative vestibular surgery. *Laryngoscope* 105:686–692.

97 Bamiou D, Davies R, McKee M and Luxon L (2000). Symptoms, disability and handicap in unilateral peripheral vestibular disorders. *Scandinavian Audiology* 29:238–244.

98 Hall C, Schubert M and Herdman S (2004). Prediction of falls risk reduction as measured by dynamic gait index in individuals with unilateral vestibular hypofunction. *Otology Neurotology* 25:746–751.

99 Vereeck L, Wuyts F, Truijen S, de Valck C and van der Heyning P (2008). The effect of early customized vestibular rehabilitation on balance after acoustic neuroma resection. *Clinical Rehabilitation* 22(8):698–713.

100 Fife T, Tusa R, Furman J, Zee D, Frohman E, Baloh R, Hain T, Goebel J, Demer J and Eviatar L (2000). Assessment: vestibular testing techniques in adults and children: report of the Neurology Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology* 55:1431–1441.

101 Campbell A, Robertson M, Gardner M, Norton R and Buchner D (1999). Psychotropic medication withdrawal and a home based exercise programme to prevent falls: results of a randomised controlled trial. *Journal of the American Geriatrics Society* 47:850–853.

102 APAC (Australian Pharmaceutical Advisory Council) (2002). *Guidelines for medication management in residential aged care facilities*, Department of Health and Ageing, Australian Government, Canberra.

103 APAC (Australian Pharmaceutical Advisory Council) (1998). *National guidelines to achieve the continuum of quality use of medicines between hospital and community*, Department of Health and Ageing, Australian Government, Canberra.

104 Queensland Health (2003). *Falls Prevention: Best Practice Guidelines for Public Hospitals and State Government Residential Aged Care Facilities Incorporating a Community Integration Supplement*, Queensland Health, Brisbane.

105 Wagner A, Zhang F, Soumerai S, Walker A, Gurwitz J, Glynn R and Ross-Degnan D (2004). Benzodiazepine use and hip fractures in the elderly: who is at greatest risk? *Archives of Internal Medicine* 164:1567–1572.

106 Gillespie W, Avenall A, Henry D, O'Connell D and Robertson J (2004). Vitamin D and vitamin D analogues for preventing fractures associated with involutional and post menopausal osteoporosis. *Cochrane Database of Systematic Reviews* (1) Art. No.: CD000227. DOI: 10.1002/14651858.CD000227.pub3.

107 Cumming R, Ivers R, Clemson L, Cullen J, Hayes M, Tanzer M and Mitchell P (2007). Improving vision to prevent falls in frail older people: a randomized trial. *Journal of the American Geriatrics Society* 55(2):175–181.

108 Lord S, Dayhew J and Howland A (2002). Multifocal glasses impair edge-contrast sensitivity and depth perception and increase the risk of falls in older people. *Journal of the American Geriatrics Society* 50(11):1760–1766.

109 Foss A, Harwood R, Osborn F, Gregson R, Zaman A and Masud T (2006). Falls and health status in elderly women following second eye cataract surgery: a randomised controlled trial. *Age and Ageing* 35(1):66–71.

110 Harwood R, Foss A, Osborn F, Gregson R, Zaman A and Masud T (2005). Falls and health status in elderly women following first eye cataract surgery: a randomised controlled trial. *British Journal of Ophthalmology* 89(1):53–59.

111 Oliver D, Papaioannou A, Giangregorio L, Thabane L, Reizgys K and Foster G (2008). A systematic review and meta-analysis of studies using the STRATFY tool for prediction of falls in hospital patients: how well does it work? *Age and Ageing* 37:621–627.

112 Freeman E, Muñoz B, Rubin G and West S (2007). Visual field loss increases the risk of falls in older adults: the Salisbury Eye Evaluation. *Investigative Ophthalmology and Visual Science* 48(10):4445–4450.

113 Eperjesi F, Wolffsohn J, Bowden J, Napper G and Rubinstein M (2004). Normative contrast sensitivity values for the backlit Melbourne Edge Test and the effect of visual impairment. *Ophthalmic and Physiological Optics* 24:600–606.

114 Anderson A, Shuey N and Wall M (2009). Rapid confrontation screening for peripheral visual field defects and extinction. *Clinical Experimental Optometry* 92(1):45–48.

115 Campbell A, Robertson M, La Grow S, Kerse N, Sanderson G, Jacobs R, Sharp D and Hale L (2005). Randomised controlled trial of prevention of falls in people aged >75 with severe visual impairment: the VIP trial. *British Medical Journal* 331(7520):817–820.

116 La Grow S, Robertson M, Campbell A, Clarke G and Kerse N (2006). Reducing hazard related falls in people 75 years and older with significant visual impairment: how did a successful program work? *Injury Prevention* 12(5):296–301.

117 Johnson L, Elliot D and Buckley J (2009). Effects of gaze strategy on standing postural stability in older multifocal wearers. *Clinical and Experimental Optometry* 92:19–26.

118 Gillespie LD, Robertson MC, Gillespie WJ, Lamb SE, Gates S, Cumming RG and Rowe BH (2009). Interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews* (2) Art. No.: CD007146. DOI: 10.1002/14651858.CD007146.pub2.

119 Hignett S and Masud T (2006). A review of environmental risk factors associated with in-patient falls. *Ergonomics* 49(5):605–616.

120 Mitchell A and Jones N (1996). Striving to prevent falls in an acute care setting — action to enhance quality. *Journal of Clinical Nursing* 5:312–320.

121 NARI (National Ageing and Research Institute) (2004). *An Analysis of Research on Preventing Falls and Falls Injury in Older People: Community, Residential Care and Hospital Settings (2004 update)*, Australian Government Department of Health and Ageing, Department of Health and Ageing, Injury Prevention Section, Canberra.

122 NPSA (National Patient Safety Agency) (2007). *Slips, trips and falls in hospital*, NHS. http://www.npsa.nhs.uk/nrls/alerts-and-directives/directives-guidance/slips-trips-falls/

123 Ozanne-Smith J, Guy J, Kelly M and Clapperton A (2008). *The relationship between slips, trips and falls and the design and construction of buildings*, Report for Australian Building Codes Board by Monash University Accident Research Centre — Report #281. http://www.monash.edu.au/muarc/reports/muarc281.pdf

124 New South Wales Health (2003). *NSW Health Management Policy to Reduce Fall Injury Among Older People*, New South Wales Health, Sydney.

125 Aronow W and Ahn C (1997). Association of postprandial hypotension with incidence of falls, syncope, coronary events, stroke and total mortality at 29 month follow up in 499 older nursing home residents. *Journal of the American Geriatrics Society* 45(9):1051-1053.

126 Tideiksaar R (2002). *Falls in Older People*, Health Professions Press Incorporated, Baltimore.

127 Cumming R, Sherrington C, Lord S, Simpson M, Vogler C, Cameron I and Naganathan V (2008). Cluster randomised trial of a targeted multifactorial intervention to prevent falls among older people in hospital. *British Medical Journal* 336:758–760.

128 Donoghue J, Graham J, Mitten-Lewis S, Murphy M and Gibbs J (2005). A volunteer companion-observer intervention reduces falls on an acute aged care ward. *International Journal of Health Care Quality Assurance Incorporating Leadership in Health Services* 18(1):24–31.

129 Hitcho E, Krauss M, Birge S, Dunagan W, Fischer I, Johnson S, Nast P, Costantinou E and Fraser V (2004). Characteristics and circumstances of falls in a hospital setting: a prospective analysis. *Journal of Geriatric Internal Medicine* 19(7):732–739.

130 Kerse N, Butler M, Robinson E and Todd M (2004). Fall prevention in residential care: a clustered, randomized, controlled trial. *Journal of the American Geriatrics Society* 52(4):524–531.

131 Boswell D, Ramsay J, Smith M and Wagers B (2001). The cost-effectiveness of a patient-sitter programme in an acute care hospital: a test of the impact of sitters on the incidence of falls and patient satisfaction. *Quality Management in Health Care* 10(1):10–16.

132 Giles L, Bolch D, Rouvray R, McErlean B, Whitehead C, Phillips P and Crotty M (2006). Can volunteer companions prevent falls among inpatients? A feasibility study using a pre-post comparative design. *BMC Geriatrics* 6:11.

133 Fleming J and Brayne C (2008). Inability to get up after falling, subsequent time on floor, and summoning help: prospective cohort study in people over 90. *British Medical Journal* 337:A2227.

134 ECRI (Emergency Care Research Institute) (2004). Bed exit alarms: a component (but only a component) of fall prevention. *Health Devices* 33(5):157–168.

135 Evans D, Wood J and Lambert L (2003). Patient injury and physical restraint devices: a systematic review. *Journal of Advanced Nursing* 41(3):274–282.

136 Evans D, Wood J, Lambert L and Fitzgerald M (2002). *Physical Restraint in Acute and Residential Care: A Systematic Review*, The Joanna Briggs Institute, Adelaide, South Australia.

137 Frengley J and Mion L (1998). Physical restraints in the acute care setting: issues and future direction. *Clinics in Geriatric Medicine* 14(4):727–743.

138 Cassel C, Leipzig R, Cohan H, Larson E and Meier D (2003). *Geriatric Medicine: An Evidence based Approach*, Springer-Verlag, New York.

139 Oliver D (2002). Bed falls and bed rails — what should we do? *Age and Ageing* 31:415–418.

140 Park M, Hsiao-Chen Tang J and Ledford L (2005). *Changing the Practice of Physical Restraint Use in Acute Care*, University of Iowa Gerontological Nursing Interventions Research Center, Research Translation and Dissemination Core, Iowa City, Iowa.

141 Clinical Epidemiology and Health Service Evaluation Unit, Melbourne Health and the Delirium Clinical Guidelines Expert Working Group, (2006). *Clinical Practice Guidelines for the Management of Delirium in Older People*, Victorian Government Department of Human Services, Melbourne.

142 ASGM (Australian Society for Geriatric Medicine) (2005). *Australian Society for Geriatric Medicine Position Statement 2: Physical Restraint Use in Older People*. http://www.anzsgm.org/documents/POSITIONSTATEMENTNO2.PhysicialRestraint-Revision.pdf

143 Meyer G, Warnke A, Bender R and Muhlhauser I (2003). Effect on hip fractures of increased use of hip protectors in nursing homes: cluster randomised controlled trial. *British Medical Journal* 326(7380):76.

144 Parker M, Gillespie W and Gillespie L (2005). Hip protectors for preventing hip fractures in older people. *Cochrane Database of Systematic Reviews* (3) Art. No.: CD001255. DOI: 10.1002/14651858.CD001255.pub3.

145 Nowson C, Diamond T, Pasco J, Mason R, Sambrook P and Eisman J (2004). Vitamin D in Australia. Issues and recommendations. *Australian Family Physician* 33(3):133–138.

146 Bischoff-Ferrari H, Dawson-Hughes B, Willett W, Staehelin H, Bazemore M and Zee R (2004). Effect of vitamin D on falls: a meta-analysis. *Journal of the American Association* 291(16):1999-2006.

147 Boland R (1986). Role of vitamin D in skeletal muscle function. *Endocrine Reviews* 7(4):434–448.

148 Osteoporosis Australia (2005). Recommendations from the Vitamin D and Calcium Forum. *Medicine Today* 6(12).

149 Working Group of the Australian and New Zealand Bone and Mineral Society, Endocrine Society of Australia and Osteoporosis Australia (2005). Vitamin D and adult bone health in Australia and New Zealand: a position statement. *Medical Journal of Australia* 182(6):281–285.

150 Chapuy M, Arlot M, Duboeuf F, Brun J, Crouzet B and Arnaud S (1992). Vitamin D3 and calcium to prevent hip fractures in elderly women. *New England Journal of Medicine* 327(23):1637–1642.

151 Trivedi D, Doll R and Tee Khaw K (2003). Effect of oral four monthly vitamin D3 (cholecalciferol) supplementation on fractures and mortality in men and women living in the community: randomised double blind controlled trial. *British Medical Journal* 326:469–474.

152 Graham K (1998). *Ask Me About Nutrition — Resource for General Practice*, Darling Downs Public Health Unit, Toowoomba, Queensland.

153 Cranney A, Guyatt G, Griffith L, Wells G, Tugwell P and Rosen C (2002). Meta-analyses of therapies for postmenopausal osteoporosis. IX: summary of meta-analyses of therapies for postmenopausal osteoporosis. *Endocrine Reviews* 23(5):570–578.

154 Klotzbuecher C, Ross P, Landsman P, Abbott T and Berger M (2000). Patients with prior fractures have an increased risk of future fractures: a summary of the literature and statistical synthesis. *Journal of Bone and Mineral Research* 14(5):721–739.

155 Ashe M, Khan K and Guy P (2004). Wristwatch-distal radial fracture as a marker for osteoporosis investigation: a controlled trial of patient education and a physician alerting system. *Journal of Hand Therapy* 17:324–328.

156 Brown J and Josse R (2002). 2002 Clinical practice guidelines for the diagnosis and management of osteoporosis in Canada. *Canadian Medical Association Journal* 167:S1–S34.

157 Close J and Lord S (2006). *How to treat: falls in the elderly* Australian Doctor:27–34.

158 O'Neill S, MacLennon A and Bass S (2004). Guidelines for the management of post-menopausal osteoporosis for GPS. *Australian Family Physician* 33:910–917.

159 Wells G, Cranney A, Peterson J, Boucher M, Shea B, Robinson V, Coyle D and Tugwell P (2008). Risedronate for the primary and secondary prevention of osteoporotic fractures in postmenopausal women. *Cochrane Database of Systematic Reviews* (1) Art. No.: CD004523. DOI: 10.1002/14651858.CD004523.pub3.

160 NCPS (National Center for Patient Safety) (2004). *National Center for Patient Safety Falls Toolkit*, US Department of Veteran Affairs.

161 Queensland Health (2001). *Patient handling guidelines*, Queensland Health, Brisbane.

162 American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention (2001). Guideline for the prevention of falls in older persons. *Journal of the American Geriatrics Society* 49(5):664–672.

163 Scheffer A, Schuurmans M, van Dijk N, van der Hooft T and de Rooji S (2008). Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. *Age and Ageing* 37:19–24.

164 Queensland Health (2002). *Falls prevention in older people: implementation workbook to accompany the falls prevention best practice guidelines for public hospitals and state government residential aged care facilities*, Queensland Government, Brisbane.

165 Zijlstra G, van Haastregt J, van Rossum E, van Eijk J, Yardley L and Kempen G (2007). Interventions to reduce fear of falling in community-living older people: a systematic review. *Journal of the American Geriatrics Society* 55(4):603–615.

Notes