

Part 7 Interventions to prevent falls and falls injury

7. Interventions to prevent falls and falls injury

The *Community Guidelines* are based on reviews of the evidence of effective interventions. However, in preventive health services, there may be a lack of evidence because an intervention is not shown to be effective in properly constituted trials, or because an intervention has not been evaluated using rigorous methodology.

The reliance of evidence based on randomised controlled trials recognises that such trials are the most rigorous form of assessing the efficacy of interventions. However, they may not be adequate or appropriate for evaluating services in the ‘real world’, which comprise a complex mix of strategies and uncontrollable variables ^[177]. This is particularly so in population-based interventions and public health programs which differ dramatically from the environment in which falls research studies of randomised controlled trials are generally conducted ^[178].

For any intervention to prevent falls to be effective and of direct relevance to health care practitioners, Close and Glucksman (2000, p.176) state that it should:

- be acceptable and applicable to the affected population (*applicability*)
- alter outcome in terms of falls or fall-related injury (*efficacy*)
- be cost effective (*cost-effectiveness*)
- be readily applicable to everyday practice (*practicability*) ^[179].

7.1 Research Evidence

Key findings for preventing falls come from reviews and meta-analyses of intervention studies to reduce falls and fall-related injuries ^[35, 36, 78, 139, 144, 178]. A number of reviews have also been undertaken of single strategy interventions, for example home modifications ^[180, 181]; exercise ^[114, 182-184], including Tai Chi ^[185]; Vitamin D supplementation ^[186, 187]; and hip protectors ^[188]. Reviews have also

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been undertaken of interventions targeting specific falls risk factors, such as fear of falling ^[189] and visual impairment ^[190].

From these reviews, there is evidence that most falls among older people are associated with identifiable and modifiable risk factors and that preventive efforts are effective ^[1]. There is less direct evidence for effectiveness of interventions to prevent fall-related injuries. Serious injuries in community-dwelling older people occur in about five to 15 percent of falls ^[38], so that large sample sizes incorporating long term follow-up are required to capture a difference in rate of fractures or serious injuries between control and intervention groups ^[36].

7.2 Translating Research Evidence into Practice

There are a number of guidelines, that are based on reviews of evidence, that are applicable across the continuum of care for the prevention of falls ^[59, 65, 87, 191, 192] and fall-related injuries, such as hip fractures ^[193, 194].

For sustainability in preventing falls, evidence must be integrated into practice and effectiveness evaluated under real life or usual conditions ^[1]. This needs to include taking into account the views, preferences and experiences of older people in relation to strategies for preventing falls ^[70]. (Discussed in Section 6.8)

7.3 Community Interventions of Known Effectiveness

The Glossary defines the terms used to describe types of interventions based on risk factors (single/multifactorial), number of intervention components (single/multi-strategy), target group (unselected/selected on the basis of risk), and type of program (personal health/public health).

7.3.1 Multi-strategy, Multifactorial Interventions

Multi-strategy multifactorial interventions include a range of components that address a number of risk factors. Such programs

have been shown to be effective in the community, both for an untargeted population of older people (not selected on the basis of risk) and for older people either with a history of falling or targeted because of known risk factors based on a falls risk assessment ^[144]. Specific recommendations for targeted community-dwelling older persons identified as at risk, are that multifactorial interventions should include gait training and advice on appropriate use of assistive devices, review and modification of medication, especially psychotropic medication, exercise programs with balance training as one of the components, modification of environmental hazards and treatment of cardiovascular disorders ^[59]. Untargeted population-based approaches which incorporate multifactorial multi-strategies (such as education, promotion of physical activity and safe footwear, home safety and medication review) have been shown to reduce fall-related injuries ^[178].

While current guidelines support multi-strategy, multifactorial falls prevention interventions both for individuals and populations at risk ^[59, 192], recent evidence suggests that for community programs for populations at risk, targeted single interventions are as effective as multi-strategy interventions, and may be more acceptable to older people, as well as cost effective and less resource intensive ^[195]. Single interventions are effective when they are directed at the major remedial risk factor for the particular target population ^[195].

Good Practice Points

- › A multi-strategy multifactorial approach is recommended to prevent falls at both community/population and individual levels.
 - › Where a single modifiable risk factor accounts for a large proportion of the falls risk, based on falls risk assessment findings for individuals or risk factor prevalence in the community, a single strategy intervention directed at reducing that risk is effective.
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7.3.2 Exercise Programs

Exercise has been the most thoroughly investigated single intervention, and there is now strong evidence to support specific types of exercise for modifying falls risk and preventing falls ^[35, 129]. Risk factors targeted in exercise programs include balance and mobility impairments, muscle weakness, poor reaction time, limitations in ability to perform activities of daily living, and fear of falling. In untargeted populations, exercise is an important component of healthy ageing programs ^[196]. The benefits of physical activity for promotion of physical, psychological and social well-being in older people have been well documented ^[196].

Based on a systematic review of exercise interventions for falls reduction, Lord et al, 2007 outlined the common features of effective exercise programs ^[35] (see Table 7.1) The key elements for effect were having a balance component, being of moderate intensity, and providing a moderate to high challenge over a greater length of time (increased dose) ^[197].

Lord (2006) has also developed an algorithm for exercise prescription (Table 7.2) ^[198]. While there is some evidence to support targeting these groups with these types of exercises, this approach is limited in at least two key areas: (1) personal preference for type of exercise, which is important for uptake and sustained engagement (2) people who don't fit in to the three groups – e.g. 70 year old with poor balance and mild cognitive impairment – who may benefit more from a one-on-one exercise program.

Table 7-1: Common Features of Effective Exercise Programs for Falls Reduction

Exercise Program	Features
Type of exercise to include	<ul style="list-style-type: none"> a. balance exercises b. exercises conducted in weight-bearing positions c. exercises reducing amount of arm support d. an additional component of moderate intensity resistance training
Prescription	<ul style="list-style-type: none"> a. progressive in intensity b. individually prescribed intensity c. addressing key risk factors of individual or population group
Nature of program	<ul style="list-style-type: none"> a. sessions of 60 minutes duration b. at least three times per week c. for a minimum of six weeks d. delivered in group or individual setting e. containing support mechanisms to motivate and maintain adherence in the long term
Design and Delivery	<ul style="list-style-type: none"> a. designed by a trained professional (most often a physiotherapist) b. delivered by a trained instructor

Source: Lord et al. (2007) p.194 ^[35]

Table 7-2: Algorithm for Exercise Prescription

Population	Program
60-80 years > general population > low risk	Untargeted group exercise for balance, strength and endurance
70-80 years or at an increased risk	Targeted group balance and strength training
80 + years or at increased risk	Home-based individualised exercises for balance, gait, strength and endurance

Source: adapted from Lord (2006) ^[198]

Many exercise trials have shown that balance training can prevent falls ^[35, 36, 199]. To be effective exercise programs need to include a balance component and need to challenge the balance system of the individual: however it is extremely important that the safety aspects for the individual are considered so as not to cause falls or injury ^[35]. Prior to commencing an exercise program, the individual should be assessed to determine the best type of exercises, exercise approach, and safety issues. Older people with varying levels of physical functioning may require different levels of supervision to ensure safety. While close supervision may be an issue for exercises conducted at home or in a group setting, several programs that can be safely and successfully conducted in these settings have been developed ^[199-202]. A group exercise program with a significant balance component, such as Tai Chi, has also been shown to be effective in preventing falls in community-dwelling participants ^[203-205].

Several trials of exercise programs that have included functional task training (e.g. stair climbing, sit to stand), often in conjunction with balance or strength training, have demonstrably reduced falls ^[35]. Since a certain level of cardiovascular fitness is required to undertake functional tasks, endurance training may also be an important

component in exercise interventions ^[35]. Moderate intensity aerobic activity for a minimum of 30 minutes on five days per week has been recommended by the American Council of Sports Medicine, and the American Heart Association, to promote and maintain health in older adults ^[196]. Walking is one of the commonest physical activities undertaken by older people ^[206], but there is, to date, no evidence that walking programs (as a single intervention) reduce falls rates ^[35].

There is strong evidence to suggest that resistance training can improve strength and power and function among older people ^[207]. However, it is less clear whether resistance training alone can prevent falls, although it has formed part of many successful fall prevention programs ^[35, 36]. Exercise programs that incorporate resistance and weight-bearing can significantly limit loss of bone mineral density, which should have an effect on fracture rates following a fall ^[36].

While exercise targeted to a person's particular functional limitations and lifestyle is more likely to be effective, even general exercise programs can be effective in healthy older people to enhance functional ability and minimise age-related decline. The promotion of physical activity in older adults should emphasise moderate-intensity aerobic activity, muscle-strengthening activity, balance exercises, and reducing sedentary behaviour to reduce falls risk ^[196].

Exercises can be conducted individually or in a group, can have various levels of supervision and be conducted in a variety of settings ^[35]. At present there are no trials for the most effective way to deliver fall and fracture prevention strategies ^[208], and no studies directly comparing group and individual (home-based) exercise ^[35].

A number of factors need to be taken into account to increase participation and adherence to exercise programs. Older people equate the term 'exercise' with formal exercise, which they perceive to be something done only by exceptional people ^[68]. Using the term 'exercise' will narrow older peoples' view of what they can be involved in to improve their health ^[68]. Other terms such as 'physical activity'

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or ‘staying active’ may be more acceptable. (Refer to the Glossary for explanation of terms ‘exercise’ and ‘physical activity’)

Incentives for participation reported by older people include: having a doctor’s advice to attend ^[209]; social support such as friends and family participating ^[206, 209, 210]; ease of facility access; and neighbourhood safety e.g. for walking programs ^[206, 210]. Intention to undertake a strength and balance training program was found to be associated with the belief that: the program had multiple benefits; was associated with a positive social identity; and that family, friends, and doctors would approve of participation ^[211]. Among factors cited as barriers to exercise participation are; lack of interest, poor health, fear of falling, and low outcomes expectation ^[206, 212]. Change in health status, perceived frailty, lack of motivation and poor self-efficacy are also cited as common reasons for non-adherence to prescribed exercise programs ^[212].

Good Practice Points

- › The term ‘exercise’ should be used by health professionals to describe a structured program of physical activity that is prescribed for the individual. However when promoting general activity options to older people, other terminology needs to be used such as ‘physical activity’, ‘healthy activity’ or ‘staying active’.
- › Multifactorial programs in targeted or untargeted populations should include an exercise component.
- › Tailored exercise programs should address identified risks and include challenging and progressive balance exercises in combination with resistance, endurance and flexibility training, if appropriate. Such exercise programs should be individually prescribed and monitored by trained personnel
- › Untargeted group exercise programs that emphasise moderate to high balance training are effective and should be promoted and implemented across Queensland.

- › The promotion of general physical activity in older adults should emphasise moderate-intensity aerobic activity (a minimum of 30 minutes on five days per week which can be done in three lots of ten minutes) and encourage strength training on two non-consecutive days of the week and a balance activity at least once per week (e.g. Tai Chi) ^[196].
- › Physical activity programs should be appropriate for the age and lifestyle of the individual.
- › Prior to undertaking a physical activity program, the individual should be consulted about individual and environmental factors which will facilitate uptake and sustained engagement so these can be identified and addressed.
- › The most appropriate option for exercise for an individual should be determined through discussion between the practitioner, the client, and if appropriate, the carer. This should consider health status, cognitive status, safety, availability and access, and personal preferences.

For further information about exercise programs such as the Otago and No Falls programs refer to the *Queensland Stay on Your Feet® Community Good Practice Toolkit* (<http://www.health.qld.gov.au/stayonyourfeet>).

7.3.3 Environmental Hazard Modifications

Reducing hazards in the home appears not to be effective in preventing falls in the general older population and those at low risk of falls ^[180]. However, for older people with higher risks of falling (i.e. with mobility limitations, visual impairment and a history of falling) home hazard assessment and modification that is professionally prescribed is effective ^[144, 213, 214]. Effectiveness may depend on improved transfer abilities and other behavioural changes ^[213, 215]. Environmental assessment and modification by a trained professional (e.g. occupational therapist) appears to contribute to the success of multi-strategy programs for prevention of falls in at-risk groups ^[35]. A belief that home modifications can prevent falls and having help at home from relatives enhances adherence to recommendations ^[216]. Potential

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sources of assistance with costs and modifications for eligible clients include the Department of Veterans' Affairs *Homefront* program (<http://www.dva.gov.au/health/homefront/intro.htm>) and the Queensland Department of Housing *Home Assist Secure* program (<http://www.housing.qld.gov.au/programs/ch/support/has.htm>). There is insufficient evidence that altering the physical home environment by removing potential hazards reduces injuries due to falls ^[181]. The effects of interventions to reduce hazards in public places are difficult to assess and there is, as yet, no strong evidence that programs to improve the safety of public places reduce falls rates ^[36].

Good Practice Points

- Professionally prescribed home hazard assessment and modification by occupational therapists should target those at high risk of falls. This will be more effective when combined with strategies to improve functional ability and modify risk behaviour.
- Targeted multifactorial programs for both individuals and the community should include home hazard reduction as a component.

7.3.4 Medication Review

Medication review is recommended for those who have experienced a fall ^[59] and is an essential part of a comprehensive geriatric assessment ^[129, 192].

Reduction of medications, particularly for those taking four or more medications, has been a prominent component in effective multifactorial interventions to prevent falls ^[59]. Alternatives to the prescription and use of some medications, particularly psychotropics, need to be acceptable to older patients, their doctors and other health professionals ^[35]. This also highlights the need for education of health professionals and older people on the quality use of medicines. Non-pharmacological interventions for the treatment of sleep disorders and anxiety in older people may be considered as an alternative to pharmacological means. These alternatives may include relaxation,

support, reassurance, avoidance of day time naps, avoidance of heavy meals and coffee before sleeping, and increased exercise ^[3].

One trial showed that withdrawal of psychotropic medication is effective in reducing falls but longer-term adherence is an issue ^[217]. Optimal adherence requires weaning off these medications combined with considerable psychological support.

Good Practice Points

- › Older people should have access to the best pharmacological agents available based on evidence-based prescribing
 - › Prescription of medications should be done in discussion with the patient to weigh up the risks and benefits of different medications and numbers of medications prescribed
 - › Regular medication review should be included in multi-strategy multifactorial interventions for both individuals and the broader community.
 - › Older people on psychotropic medication should have their medications reviewed and gradually reduced / discontinued if possible.
 - › Compliance issues with the withdrawal and ceasing of psychotropic medication need to be addressed and monitored, in consultation with relevant health professionals.
 - › Consider reducing or eliminating the need for psychotropic medications, through non-pharmacological, cognitive-behavioural interventions.
 - › Alternatives to psychotropic medication use should be considered for older people presenting with sleep disorders, anxiety, etc.
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7.3.5 Vision Assessment

While there is evidence that cataract surgery can prevent falls ^[218], it is less clear that falls are prevented through comprehensive vision and eye examinations with referral for appropriate interventions ^[219]. Nonetheless older people should be encouraged to have their eyesight checked by an optician regularly (at least annually) to detect

any remedial cause of decline in visual function ^[129]. The estimated prevalence of low vision increases exponentially with age and in the majority of cases, the causes are readily treatable ^[220]. Older people need to be advised that their risk of falls may increase in the short term after receiving new glasses or a change in lens prescription. Older people also need to be advised that glasses for reading, such as multifocal and bifocal glasses, can distort their vision of objects and stair edges if worn when walking, which can increase their risk of falling.

Good Practice Points

- › Expedite surgical intervention for cataracts if possible.
- › Include regular reviews of vision in multi-strategy multifactorial interventions for both individuals and the broader community.
- › Advise older people that a change of glasses may initially increase their risk of falls.
- › Ensure that people who have had falls involving environmental obstacles (such as stairs and curbs) consider using distance glasses rather than bifocal or multifocal glasses when walking.

7.4 Potentially Effective Interventions

7.4.1 Cardiovascular Interventions

Falls in older persons may sometimes result from arrhythmias, orthostatic hypotension, or other disorders leading to a transient loss of consciousness (syncope) ^[81]. Falls that have a cardiovascular cause can be assisted by intervention strategies directed to syncope, such as medication change or cardiac pacing ^[59]. While pacemakers for those with carotid sinus syncope were found to prevent falls in one study ^[221] the results have not been replicated and this treatment for recurrent falls is not currently recommended ^[59]. Those individuals with unexplained falls, syncope, or dizziness should be referred for specialist assessment, investigations, and intervention ^[35].

Good Practice Point

- › Reported episodes of dizziness, faintness, syncope, unsteadiness or unexplained falls should be investigated and addressed ^[3].

7.4.2 Bone Strengthening Medications/Supplements

Fractures can be reduced through a number of medications that are used widely to prevent or treat osteoporosis (e.g. hormone replacement therapy (HRT), calcium, vitamin D, antiresorptive agents) ^[59]. Every individual with a low trauma fracture should be investigated for exclusion of underlying osteoporosis and considered for effective treatment to reduce future fracture risk. Despite both the magnitude of the problem and the introduction of osteoporosis treatment guidelines, most high-risk individuals (possibly 80%) are still not identified, and thus not treated ^[222].

Evidence from meta-analysis suggests that supplementation with vitamin D appears to reduce the risk of falls among community-dwelling and institutionalised older individuals ^[186]. Calcium plus vitamin D supplements reduces fracture incidence, including hip fracture, in institutionalised as well as independently living older people ^[194].

While research on healthy active adults aged 18-87 years living in Brisbane showed that 42.5 percent of this sample had deficient or insufficient levels of vitamin D ^[223], there is insufficient research to be able to recommend a safe amount of sun exposure required to synthesise a beneficial amount of vitamin D without exposing people to further skin cancer risks ^[223]. Health professionals need to review the vitamin D status of older people and consider supplementation as an alternative.

Good Practice Points

- › Older people with a history of low trauma fracture should be investigated for osteoporosis and treated as appropriate.
- › Older people with an identified vitamin D deficiency should be advised to take supplements of vitamin D and calcium.
- › There is insufficient research to be able to recommend an amount of safe sun exposure to synthesise a beneficial amount of vitamin D; therefore, deliberate exposure to sunlight is not advised.

7.4.3 Education Programs

Studies of multifactorial interventions with behavioural and education programs are beneficial^[59] resulting in changes to reported knowledge of falls risk factors^[36]. However there is limited evidence that targeted or untargeted education in isolation (i.e. with no follow-up) reduces fall rates^[59, 87].

7.4.3.1 Social Marketing

There is limited empirical evidence that identifies the elements of a good social marketing campaign for falls prevention^[5]. However, an evaluation of *Stay on Your Feet*® (Western Australia)^[224] highlighted the need for campaigns targeted to seniors that: (a) convince them that falls are an issue for older people; (b) communicate the serious consequences of falls, including their impact on mobility and independence; and (c) highlight the need for seniors to consider their personal risk of falling. The challenge for social marketers is to raise awareness in the target population of the risk of falling without unnecessarily raising their fear of falling^[69, 83].

7.4.3.2 Peer Education

There are a number of community programs for preventing falls that use older people as volunteers or ambassadors to deliver falls education. Such peer education models include the *Stay on Your Feet* program^[225, 226] and COTA Peer Education Projects funded through

the Australian Government National Falls Prevention for Older People Initiative (<http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-pubhlth-strateg-injury-falls-projects.htm>). Evaluations of the process and impact of these models have shown the potential of peer education in preventing falls because of apparent acceptability to older people and capacity to empower ^[227, 228]. The reduction of falls in one study ^[229] may be partly due to the use of theoretical models for adult learners, such as valuing shared learning among peers and peer modelling for change ^[65].

7.4.3.3 Cognitive-Behavioural Programs

Because fear of falling and risk of falls share predictors ^[91], interventions that use cognitive–behavioural strategies to reduce fear of falling have been shown to reduce falls rates ^[98]. Such interventions emphasise self-efficacy and encourage behavioural change to promote a realistic and adaptive view on falls risk by encouraging older people to perform activities safely ^[189]. Programs incorporating cognitive-behavioural approaches have reduced fear of falling ^[189] and have the potential to reduce the effects of other psychological risk factors ^[36]. It is crucial that changes in falls efficacy remain consistent with actual falls risk, otherwise promotion of balance confidence beyond balance abilities may lead to risk-taking behaviour and so to falls. A trial of *Stepping On*, a community-based program using a small-group learning environment followed by a home visit, showed a 31 percent reduction of falls in the intervention group ^[98]. This study had a strong focus on participatory methods by empowering older people through providing information, trialling different interventions, and group discussion.

Good Practice Points

- › Education strategies to raise awareness and provide information should not be used alone but included in a multi-strategy multifactorial intervention for both individuals and the broader community.
 - › Cognitive-behavioural approaches to supplement education programs can be included in a targeted multi-strategy multifactorial intervention for individuals.
 - › Education and social marketing campaigns should note that terms such as ‘fall’ and ‘falls prevention’ can have negative connotations: interventions need to be communicated as a lifestyle-enhancing measure and as a means for staying independent for longer.
 - › Information should be relevant and useable, be available in different languages, and be culturally sensitive.
 - › Cognitive behaviour therapy to reduce fear of falling should only be used in conjunction with assessment of fall risk and interventions to reduce falls.
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7.4.4 Assistive Devices

Studies of multifactorial interventions that consider assistive devices (mainly prescription and/or training in the use of walking aids) have demonstrated benefit ^[35, 59]. However there is no direct evidence that use of assistive devices alone will prevent falls ^[35, 36, 59]. (See also Section 5.2.8.4).

Good Practice Point

- › Targeted multi-strategy multifactorial interventions should include advice on appropriate use of assistive devices, including correct use and maintenance.
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7.4.5 Technological Aids

Smart home technology has the capacity to facilitate ageing-in-place by assisting older people and their carers with emergency response, fall prevention/detection, reminder systems, medication administration

and assistance for those with hearing, visual or cognitive impairments ^[230]. Such devices can improve physical and psychosocial capacity and enhance independence, especially for those living alone. However, there is no direct evidence evaluating the effectiveness of technological aids (such as personal alarms) in preventing falls or reducing the deaths (mortality) and disability (morbidity) associated with ‘long lies’ after a fall ^[36].

Good Practice Points

- › Older persons living alone and/or identified as at risk with cognitive/vision/mobility impairment and/or their carers should receive information about the technological aid options to improve their physical and psychological capacity and enhance their independence.
- › As part of a multifactorial and multi-strategy intervention older people at risk of falling and/or with a fear of falling should be shown how to get up from the floor safely and independently so as to avoid the risk of long lies.

7.4.6 Footwear and Foot Problems

While some trials of specific footwear interventions report improvement in intermediate outcomes, such as balance and sway, there is little evidence from experimental studies of footwear interventions that consider falls ^[59]. Although there is little information on the influence of footwear design features on postural stability and falls, it seems reasonable to suggest that older people are advised against wearing of high heeled shoes and shoes with very soft or slippery soles ^[35]. While advising older people on the potential hazards of certain types of footwear may be a potentially useful for preventing falls, compliance issues may limit the efficacy of such an intervention ^[35]. Foot and ankle problems are common in older people and are also associated with impaired balance and performance in functional tests ^[231] as well as the risk of falls ^[232]. A few studies have targeted foot problems as part of multifactorial intervention strategies ^[233, 234], but there is a lack of evidence for podiatry referral

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as an intervention for preventing falls in community-dwelling older people. (See also Section 5.2.8.3)

Good Practice Points

- › Through multifactorial and multi-strategy intervention, older persons and or their carers should be given information about foot care and footwear features that may reduce falls risk.
- › The most appropriate shoe has a low heel, a firm midsole, a supporting heel collar and a slip resistant sole.
- › Older people should be screened for foot problems which may increase the risk of falls and be referred for podiatry assessment and treatment.

7.4.7 Hip Protectors

There is evidence that hip protectors to minimise fall-related hip fractures are an ineffective intervention for those living at home ^[188]. Adherence contributes to their reduced effectiveness.

Good Practice Point

- › Hip protectors can be recommended for older people who are at high risk of hip fracture (defined as greater than 80 years of age with a history of falls and /or osteoporosis), and for whom there is no perceived barrier to their use ^[3].

7.4.8 Nutrition

There is limited evidence that nutritional assessment, advice and supplementation alone is an effective intervention for falls in community-dwelling older people ^[36, 192]. Nutrition counselling was found to be effective as part of a multifactorial risk reduction program ^[235]. In a recent trial, Swanenburg et al, 2007 ^[236] investigated whether a program of exercise and nutritional supplement (calcium/vitamin D and protein) would have a larger effect on fall-related outcomes than calcium/vitamin D supplementation only, in older people with low bone mineral density. Results showed there was 89

percent reduction in falls reported in the experimental group (who had exercise and nutritional supplementation) compared with the control group (who had nutritional supplementation only). Further research trials are needed to assess the effectiveness of nutritional interventions on risk of falling.

Good Practice Points

- › Advice about adequate nutrition and a balanced diet should be included in multi-strategy multifactorial interventions for both individuals and the broader community.
 - › Prior to commencing an exercise program, it should be recognised that adequate and appropriate nutrition is an important adjunct to providing necessary energy requirements for optimising physical activity. Refer Section 5.2.7.4
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7.4.9 Lifestyle Interventions

Modifiable behaviours such as smoking, excessive alcohol consumption, inadequate activity, low body mass index, and lack of preventive health care, all are risk factors for osteoporotic fractures, particularly fall-related hip fractures [104, 109, 113, 114, 237]. Lifestyle programs that address dietary intake, physical activity, smoking habits and environmental risk factors for osteoporosis and falls have potential to reduce fracture incidence [238-240]. While lifestyle interventions have focussed on behavioural risk factors for falls and osteoporotic fractures, there are other psychosocial factors associated with falls [241, 242] and fall-related injuries [243] that have largely been ignored as the focus of interventions to prevent falls. Programs to increase community integration, raise morale, reduce social isolation, and engage older people in social and productive activity have the potential to reduce falls – this was demonstrated in a controlled study on the impact of professionally conducted cultural programs on the physical health, mental health, and social functioning of older adults [244]. In a non-randomised controlled trial, those participating in a choral group demonstrated a reduction in reported falls as well as better morale

and less loneliness in comparison with a control group ^[244]. The potential of such ‘healthy ageing’ programs to reduce fall incidence in community-dwelling older people has been discussed in Section 4.3.2.

Good Practice Point

- › Interventions to raise awareness of, and address lifestyle risk factors, should be widely promoted and incorporated into programs for older people to promote healthy active ageing.
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7.5 Summary of Intervention Strategies to Address Modifiable Risk Factors

Interventions for preventing falls that address the most important modifiable risk factors (see Table 5.1 in Section 5.3) are summarised in Table 7.3. Since few risk factors occur in isolation, most interventions will be multi-strategy, addressing multiple risk factors. While the focus of interventions in Table 7.3 is on modifiable risk factors, interventions aimed at promoting healthy active ageing and minimising fall-related injury can be adapted for all older people, whatever their risk factor status.

Table 7-3: Intervention Strategies to Address Modifiable Risk Factors

Risk factors	Intervention strategies
Socio-demographic Factors	
Poor social networks/ social isolation	<ul style="list-style-type: none"> ➤ programs to promote social activity and reduce social isolation
Psychological Factors	
Fear of falling	<ul style="list-style-type: none"> ➤ education program for cognitive/ behavioural change ➤ exercise including balance and functional exercise program such as Tai Chi
Other psychosocial factors (depression, poor self-rated health, cognitive impairment, sleep disturbances)	<ul style="list-style-type: none"> ➤ referral to geriatrician, psychiatrist, psychologist, pharmacist or occupational therapist for management ➤ education program for cognitive/ behavioural change ➤ exercise program ➤ general health promotion program
Risk taking behaviour	<ul style="list-style-type: none"> ➤ cognitive/behavioural education program ➤ home assessment/modification
Physical Functional Capacity	
Limitations in daily living activities	<ul style="list-style-type: none"> ➤ exercise with functional training ➤ advice on use of aids ➤ home assessment/modification to assist mobility

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Risk factors	Intervention strategies
Impaired balance	<ul style="list-style-type: none"> › exercise specifically for balance retraining › advice on use and maintenance of walking aids
Impaired gait	<ul style="list-style-type: none"> › exercise for balance and functioning training › advice on need for, use and maintenance of walking aids › home environment assessment
Sensory and Neuromuscular Factors	
Visual impairments	<ul style="list-style-type: none"> › medical/surgical interventions for treatable eye diseases- specifically cataract surgery › referral to optometrist/ ophthalmologist for vision check and prescription of appropriate spectacles › home hazard assessment and environmental modifications to assist mobility and safety
Reduced muscle strength	<ul style="list-style-type: none"> › exercise including strength training › nutritional advice/supplements
Poor reaction time	<ul style="list-style-type: none"> › exercise emphasising co-ordination and rapid responses
Reduced vestibular function	<ul style="list-style-type: none"> › specialist referral for vestibular rehabilitation

Risk factors	Intervention strategies
Medical Factors	
Medical conditions	<ul style="list-style-type: none"> › treatment with medical or surgical interventions. › medication review with general practitioner/pharmacist › referral to allied health for treatment/rehabilitation eg physiotherapy, occupational therapy, audiology, podiatry › referral to preventive health programs eg chronic disease self-management programs › exercise program specific to needs
Medications Use	
High risk classes of medications	<ul style="list-style-type: none"> › medication review by general practitioner/pharmacist › medication withdrawal if indicated (may need some emotional/psychological support and time) › investigation of alternative cognitive/behavioural strategies for anxiety, depression and sleep disturbances
Polypharmacy	<ul style="list-style-type: none"> › medication review by general practitioner/pharmacist › education on wise use of medicines
Lifestyle Factors	
Alcohol abuse, smoking	<ul style="list-style-type: none"> › referral to self-help organisations by qualified practitioner such as an occupational therapist › general health promotion programs

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Risk factors	Intervention strategies
Inactivity	<ul style="list-style-type: none"> › general health promotion programs emphasising physical activity › assessment and management of barriers to participation
Inadequate nutrition/ loss of body weight	<ul style="list-style-type: none"> › referral as appropriate to dietician › education and social interventions to address causes › dietary supplements (calcium, vitamin D, protein) › exercise to maintain muscle mass and strength together with dietary supplements
Environmental Factors	
Home hazards	<ul style="list-style-type: none"> › home assessment and modification › exercise (functional training) to assist safe mobility › vision assessment and referral if appropriate › education for cognitive/behavioural change
Foot problems	<ul style="list-style-type: none"> › education and referral as appropriate to a podiatrist
Poor footwear	<ul style="list-style-type: none"> › advice with regard to safe shoes for indoor and outdoor use
Inappropriate walking aids	<ul style="list-style-type: none"> › education in use of walking aids › appropriate prescription by physiotherapist › exercise (gait and balance retraining) to assist mobility

7.6 Preventing Falls in Special Population Groups

7.6.1 CALD Communities

There is a large projected rise in the population of older Australians who were born in countries in which English was not the usual first language. This has led to an increasing requirement for falls prevention programs that are tailored to linguistic and cultural requirements and differences in health-seeking behaviours and attitudes ^[47]. To date, most studies on preventing falls have focussed on people who speak English: there has been limited research, mostly unpublished, on the effectiveness of strategies to prevent falls in CALD communities ^[36]. Further research is needed to consider the specific needs of these communities and to identify the cultural differences that may impact on the effectiveness of such programs, for example, how to deliver physical activity within these groups. The need for culturally sensitive falls prevention resources is recognised through funding for a number of projects for CALD communities by the *Australian Government National Falls Prevention for Older People Initiative* <http://www.health.gov.au/internet/wcms/publishing.nsf/Content/health-pubhlth-strateg-injury-falls-projects.htm>. Most falls prevention activity targeting CALD communities has involved translating existing resources into a limited number of languages, generally those most prominent in the geographic area of distribution. This approach to preventing falls in these communities has limitations: any approach ideally needs to be developed and implemented with in partnership with older members of the CALD communities.

7.6.2 Aboriginal and Torres Strait Islander People

Except for a water-based exercise group with Aboriginal Elders ^[245], there is little evidence of strategies for preventing falls that specifically target older Aboriginal and Torres Strait Islander communities. Many of the strategies suggest multidisciplinary involvement, and such services may not be available in rural and remote communities ^[3]. An

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analysis of the Health Assessment (HA) items introduced in 1999 as part of the Enhanced Primary Care Package suggests a significant and persistent disparity in the uptake of items for older patients among Aboriginal and Torres Strait Islander peoples compared to other older Australians [246]. The initiatives to promote health checks in the Aboriginal and Torres Strait Islander community are valuable resources. There needs to be further engagement of primary care providers and the community around uptake of the HA items to ensure that the anticipated health benefits eventuate [246].

Principles for good practice in injury prevention, including from falls, are outlined in *The National Aboriginal and Torres Strait Islander Safety Promotion Strategy* [49]. A storybook *Falls are not for me!*, designed to be used by health care professionals, has been developed for use as an education resource for Aboriginal and Torres Strait Islander older people. It is part of the *Resource Suite for Australian Hospitals and Residential Aged Care Facilities* [3] available at <http://www.safetyandquality.org>. Although it was developed for the hospital and residential aged care settings, there are some elements that are useful for those working in the community setting.

7.6.3 Cognitively Impaired

Many trials specifically exclude people with cognitive impairment, which means that there is limited evidence for effective prevention of falls in this group of older people [192]. A systematic review [247] found conflicting evidence regarding the effect of physical training on motor performance and falls in older people with cognitive impairment. A multifactorial intervention for older people with cognitive impairment and dementia presenting to the Emergency Department after a fall was not shown to be effective [51]. However, in other settings (hospital and residential care settings) successful multifactorial studies of falls prevention have included people with and without cognitive impairment [248-250]. More research is needed on additional or different approaches for effective falls prevention for people with cognitive impairment in community settings.

In the treatment of cognitive impairment and dementia, recent evidence ^[251] shows the condition can be treated and possibly prevented through interventions that promote mental health, lifelong education, functional intimate relationships and social engagement, and that target healthy eating, dietary supplementation, exercise and effective cardiovascular treatment. Such preventive health interventions that target a major risk factor for falls would also potentially reduce the risk of falling.

7.6.4 Post Hospital Discharge

Another population group with special needs in falls prevention are those recently discharged back to the community following an episode of care in hospital. Many older people are admitted to hospital and during their stay approximately 36 percent will experience a decline in function ^[252]. Acute illness and adverse effects of treatment can lead to functional decline, prolonged bed rest can result in muscle loss and increased body sway, and medication changes can impact on cognitive status and psychomotor ability ^[252]. All these factors contribute to increased falls risk immediately after discharge from hospital ^[252]. Predictive indicators of increased falls risk post hospitalisation are decline in mobility, the use of an assistive device, low MMSE at discharge and self reported confusion post discharge ^[252].

The first month after discharge is a high risk time for falls. To reduce this risk, a person's mobility function needs to be maintained while in hospital and the causes of confusion detected and treated ^[252]. Post acute care, the rehabilitation phase should include a multi-component exercise program to improve strength, balance and functional skill as part of outpatient discharge program ^[253, 254]. An issue identified in the latter study ^[254] was that the improved functional performance initially gained by program participants did not lead to increased physical activity when the rehabilitation program concluded. Participants returned to their habitual sedentary lifestyle ^[254]. To sustain rehabilitation efforts there needs to be available community exercise programs that improve strength, balance and functional skills. These

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also need to provide social contact, a buddy system, encouragement from a health professional, and transport options ^[254].

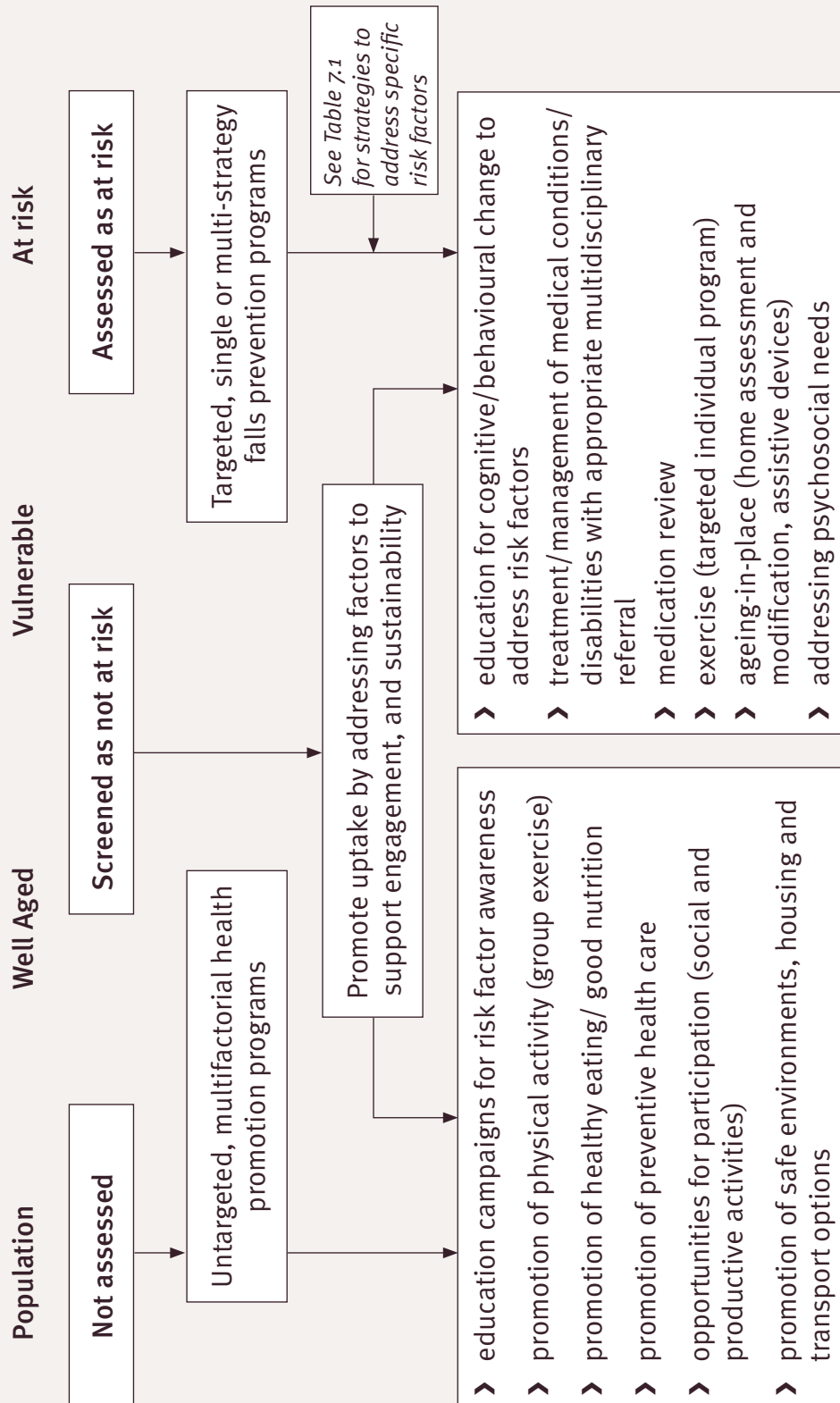
Good Practice Points

- › After hospital discharge patients at risk of falls need to be referred to a rehabilitation program that improves strength, balance, and functional skills.
 - › After completing rehabilitation program health professionals need to encourage and refer older people to community strength and balance programs.
 - › There needs to be greater availability of community exercise programs that improve strength, balance and functional skills and which also provide social contact and options for transport.
-

7.7 Implementation of Interventions to Prevent Falls

Recommended pathways of evidence-based interventions to prevent falls interventions are outlined in Figure 7.1.

Figure 7-1: Recommended Pathways for Preventing Falls



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7.7.1 Program Coordination

An integral component of any program to prevent falls is the ongoing need for consistent standardised messages, resources, systems and processes of communication about the care of the individual between programs, services, agencies, professionals, family and carers across all settings. This will help reduce duplication of services and increase credibility and acceptance of interventions with older people. In 2008, Queensland Health is trialling a falls safety officers implementation pilot program to create a consistent, coordinated and evidence-based approach to falls prevention in older persons across all levels of the health continuum. This is to be achieved at the local (Health Service District) level, the zonal (Area Health Service) level and ultimately, across the State.

Building on Existing Programs, Resources and Infrastructure

A number of programs operating within Queensland aim to build ‘age-friendly’ communities and promote healthy, active ageing within their area (e.g. *Stepping Out* and *Steady Steps*). There are also opportunities to link prevention of falls with current health priorities (e.g. chronic disease management, healthy ageing, promotion of physical activity and healthy eating) as well as social priorities (e.g. safe communities, smart housing, and social isolation) ^[5].

A mechanism for developing interventions at the community level is the Queensland *Stay On Your Feet*® *Community Good Practice Toolkit* available at: <http://www.health.qld.gov.au/stayonyourfeet>

7.7.2 Partners and Stakeholders

The responsibility for preventing falls is outside the scope of any one agency, and there is a need for an inter-sectoral and inter-organisational approach. It is anticipated that a wide variety of people who work with older people will partners in implementing community falls prevention strategies ^[4]. The key partners or stakeholders include:

- › older people, their families, carers and organisations who represent them
- › organisations and individuals who provide health services to older people;
 - › Australian, State, Territory and local health services
 - › medical officers including general practitioners, geriatricians and other specialists
 - › nurses including specialist, generalist and practice nurses
 - › allied health including pharmacists, psychologists, physiotherapists, exercise physiologists, podiatrists, optometrists, nutritionists, dieticians, occupational therapists, ambulance officers and diversional therapists.
 - › managers of supported accommodation and retirement services
 - › community and population health workers
 - › acute, sub-acute and residential aged care workers
 - › aged care assessment teams
- › planners and service deliverers in relevant non-health settings;
 - › local recreational, fitness and leisure facilities
 - › transport services
 - › local government
 - › architects, builders, urban planners
 - › businesses and community groups that provide services or products for older people
 - › Australian standards
 - › training and education providers including universities, TAFE colleges and private training organisations
 - › product safety groups

7.7.3 Challenges to Implementation

Despite the evidence of effectiveness, the current application of research findings to practice has yet to affect the unacceptably high

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rates of falls and falls-related hospitalisations in Australia ^[255]. However research is continuing to monitor intervention effectiveness and the results will inform future planning.

Facilitators ^[5] to implementing evidence based practice include a number of aspects

- › Working with partners (including the target group – older persons themselves) for whom activities are already part of core business.
- › Sharing knowledge and expertise amongst partners and across disciplines so each understands their contexts, roles and responsibilities in addressing falls prevention and exploring mutual benefits. Ensuring a regional approach to falls prevention services and activities.
- › Considering at the outset those who might have a role in ongoing implementation and engaging key stakeholders early to ensure sustainability.

Barriers concerning the adoption of evidence-based strategies in United States populations have been noted in the literature ^[256], but many would also apply in the Australian context:

- › For health care providers
 - › time limitations
 - › competing demands
 - › no mandate to address falls
 - › lack of knowledge and skills
 - › geriatric conditions not part of professional training
 - › complexity caused by multifactorial nature of fall evaluation and management
 - › focus is on diagnosing and treating individual diseases
 - › fragmentation and lack of coordination
 - › need to coordinate and refer across settings and provider groups
 - › provider groups do not understand each other's roles and skills
 - › components of the programs are outside the health care system

- › shortage of multidisciplinary professionals
- › lack of sustainability
- › requires dedicated people for coordination
- › For individuals
 - › program has to be relevant, accessible, affordable
 - › motivation needs to be maintained.

However, these challenges can be overcome by working together in a coordinated and integrated manner across the health continuum: there is already a strong commitment within Queensland for falls prevention initiatives ^[5].

Good Practice Point

- › Systems should be established within each health district, area health service and state that supports coordinated and integrated falls prevention activities and interventions across these areas.
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