

**Human  
Services**



**Peoplefirst**

Evidence-Based Health Promotion  
Resources for Planning  
**No. 3 Falls Prevention**

**Public Health Division**

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## **Evidence-Based Health Promotion**

The Victorian Government is committed to supporting evidence-based practice in the planning and implementation of effective health promotion. The practical use of evidence promises better health outcomes by informing decision-making by practitioners, program planners and funding bodies as they develop and select health promotion strategies, methods and activities.

The Public Health Division of the Department of Human Services, in collaboration with statewide health advancement organisations, is working towards providing quality advice on health promotion practice. This involves preparing, and enabling access to, systematic reviews of the effectiveness of different kinds of interventions.

Evidence-based reviews provide a method of identifying the most effective and efficacious interventions. They also provide information to help ensure efficient use of resources. The findings of these reviews are targeted to those needing to make decisions about the type of programs that should be developed and implemented; they do not tell practitioners how to deliver programs.

The advice provided by such reviews complements, rather than replaces, the practical experience and critical judgement of planners and practitioners. The recommendations need to be carefully considered in relation to the context for implementation to ensure a balanced and realistic application of the principles.

Significant logistical and methodological challenges are associated with reviewing the evidence base for health promotion. The amount of available evidence is often very limited and the quality highly varied. For this reason, these reviews should be seen as a first step only, requiring ongoing enhancement and critical application.

This publication is part of a series initiated by the Public Health Division. The following four documents initiate the series:

- *Evidence-Based Health Promotion: Resources for Planning. No.1 Oral Health*
- *Evidence-Based Health Promotion: Resources for Planning. No.2 Adolescent Health*
- *Evidence-Based Health Promotion: Resources for Planning. No.3 Falls Prevention*
- *Evidence-Based Health Promotion: Resources for Planning. No.4 Child Injury Prevention (to be published in 2001)*

These publications use current evidence in each field and contain a critical appraisal of the findings. Recommendations for implementation will assist health promotion funders, planners and practitioners requiring an evidence base for their work.

Summary assessments of individual programs evaluated as part of these reviews will be made available through a series of electronic Web-based databases.

Feedback on these publications and suggestions for further topics are welcome and can be made to the Health Development Section, Public Health Division, on tel: (03) 9637 4023.



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## Executive Summary

Falls are common among older Australians living in their own home and can have significant cost to the individual and the community in terms of morbidity and mortality, reduced confidence and activity, as well as financial burden. Many falls prevention programs have been developed in recent years which aim to reduce the frequency and severity of falls, as well as addressing a range of falls risk factors. However, much of this work has occurred in isolation, with minimal communication beyond the local area of development. As a consequence, there can be a duplication of effort; lack of communication about the strengths and weaknesses of programs; and minimal evaluation and reporting of outcomes.

The major aims of this review are:

- To develop a critical appraisal system for application to falls prevention programs.
- To critically appraise the community-based falls prevention programs identified.
- To identify a means to enable access to the information derived from these processes.
- To develop a database of recent community-based falls prevention programs in Australia.

This evidence-based planning resource forms part of a review of community-based falls prevention programs commissioned by the Public Health Division, Victorian Department of Human Services, and undertaken by the National Ageing Research Institute. The full report of this work and a database of 131 community-based falls prevention programs complement this evidence-based resource and are available on the Internet as separate resources.

The focus of this review was to ascertain the efficacy of community-based falls prevention programs. A set of evidence-based evaluation guidelines was developed, drawing on available research and expert opinion. The guidelines encompassed the full spectrum of activities pertinent to falls prevention and health promotion programs. This included issues concerning:

- The design and development of programs.
- The content of programs (in particular the approach adopted to address the issue of falls).
- The sustainability and effectiveness of programs as reported by organisations directly involved in their implementation.

The number of dedicated falls prevention programs increased substantially within the last two years in Australia. A multi-factorial and multi-strategic approach to falls prevention was frequently adopted by organisations. There was also a diverse range of target groups and locations and a variety of individuals involved in implementing programs. A significant number of falls prevention programs were sustainable and measures of sustainability have been incorporated into several new programs.

While programs predominantly aimed to reduce the rates of falls among older people, the primary target group, only a small number have been able to report this as an outcome. Nevertheless, some programs have demonstrated intermediate outcomes, such as improved balance. Other target groups for programs included sub-groups of older people (for example, frail older people receiving Home and Community Care services), as well as medical and other health professionals and families or carers of older people at risk of falling.

The critical appraisal process identified the strengths and weaknesses of the programs included in the review. Most programs performed well in the program design and development and content sections of the evaluation guidelines. Similarly, the majority of organisations could identify processes for sustaining their program and rated highly in this section. In contrast, the limited evaluation of falls prevention programs resulted in very few programs rating well in the evaluation and effectiveness section of the guidelines. Formal evaluation of existing programs

will provide a sound basis for informing new program development or in restructuring existing programs in line with the best available evidence in falls prevention.

There remains scope for further refinement of existing programs and development of other innovative approaches to falls prevention for older Australians. The resources from this project will facilitate this development, including increasing networking and sharing of information, while minimising duplication of effort. Together with a range of other current initiatives, the outcomes from this project contribute to the goal of reducing falls and associated injuries among older Australians.

## **Recommendations for Falls Prevention Strategies**

Five broad program types that could be incorporated into a falls prevention program were identified:

- Education
- Structured exercise
- Home hazard review
- Public safety
- Individualised risk factor assessment and management programs.

Current evidence suggests that falls prevention among older people can be achieved using single interventions (for example, exercise and home hazard assessment) or multiple intervention programs, particularly those based on a comprehensive individual assessment and targeted management program. Drawing on this evidence and the evidence-based evaluation guidelines developed for this review, two examples of generic, evidence-based interventions were developed and are described below. The evidence-based evaluation guidelines provide a framework that can be applied in developing or refining any type of falls prevention program.

The first example, 'Individualised risk factor assessment and management involving general practitioners (GPs) screening older clients', was selected because it recognises the multi-factorial nature of falls and, considering that approximately 80% of Australians visit their GP each year, he or she is in an ideal position to undertake this initial screening.

The second example, 'A structured exercise intervention focusing on balance and strength training', was selected because it recognises that improvements in intermediate outcomes, such as improved balance, are associated with participation in an exercise program. Studies have also reported reductions in falls rates where the exercise program targeted balance retraining and where the program was implemented in conjunction with other intervention types, including home hazard assessment.

### **Example 1. Individualised risk factor assessment and management involving general practitioners screening older clients**

This intervention involves screening older people to identify falls risk, in conjunction with implementing a targeted management plan. It is envisaged that such an intervention would be trialled and evaluated in a small number of medical practices and extended more broadly on completion of the trial.

#### **Design and Development**

- The intervention would target people over the age of 65 presenting to their GP.
- A steering committee would be established to oversee the program.

- Focus groups would be conducted involving older people not participating in the intervention to determine barriers and limitations to older people.
- The language and cultural backgrounds of the target group would be taken into consideration with resources produced, as well as access to, and use of, interpreters.
- A needs analysis would be conducted to ascertain medical practices with a high percentage of older clients.
- A search of similar programs using the Falls Intervention Database would be conducted.
- The intervention would be promoted through various media.
- Follow-up of participants would initially be scheduled at three, six and 12 months for those identified as being at risk of falls and then on an annual basis.

### **Content**

The initial screening undertaken by the GP as part of the intervention would utilise the Cwikel screening tool incorporating a slight modification (Cwikel et al., 1998).

Instead of performing the five metre walk in the Cwikel protocol, it is proposed to include the 'Timed Up and Go' test (Podsiadlo & Richardson, 1991). This test can be performed in a smaller area (such as most GP's offices), compared to the five metre walk in the Cwikel protocol. The gait style section of the Cwikel screening tool would be maintained, however performance would be rated during the Timed Up and Go test.

### **Implementation**

Upon completion of the needs analysis, medical practices rather than specific GPs would be selected to participate and randomly allocated to the control or intervention group. Participants will be recruited from participating medical practices over a six-month period and would be invited to attend a subsequent appointment for a brief falls screen. Information about the project would be provided to all potential participants.

The clients of the GPs in the intervention group would be screened with actions being recommended and facilitated through GPs. Other medical practice staff would assist with referrals and provide relevant information to clients. For each point included in the screening tool, an action would be listed.

The clients of the GPs in the control group would be screened, however the screening would not be associated with any structured intervention protocol.

### **Evaluation and Outcomes**

Both the intervention and control groups would be followed-up at three, six and 12 months and re-screened. Incidence of falls and injurious falls would be monitored through a falls diary returned at the end of each month, with staff following-up those not returned or where falls are reported. In the intervention group, issues related to compliance with management recommendations would be investigated.

Re-assessment of participants on an annual basis would enable ongoing evaluation of the intervention and provide an opportunity to review and modify the intervention in response to the outcome of the evaluation.

### **Sustainability**

The screening process would take minimal time and could therefore be factored into a standard GP consultation. This is a key factor in increasing the likelihood of program uptake and sustainability. An in-service training program would be established to ensure that new staff

could be readily educated in relation to the screening process and procedures. An original copy of the resources developed and utilised as part of the intervention, including the screening tool, pamphlets and posters, would be located at the medical practice for easy duplication as required.

Following evaluation of the pilot program, the program could be extended if the results are indicative of reduced falls and injuries and high compliance both among GPs and their older clients.

### **Example 2. A structured exercise intervention focusing on balance and strength training**

The structured exercise intervention would be implemented in a number of community health centres and fitness centres. It would incorporate balance and strength training exercises with classes conducted by trained instructors, allied health staff and peer leaders who had undergone some initial training in relation to specific exercises to be incorporated.

#### **Design and Development**

- The target group would be people over the age of 65 with or without an existing balance problem.
- Participants would be recruited through media promotion and through health centre staff recommending appropriate clients. An information sheet describing the potential benefits of the program, issues of access and location of classes, would be distributed to all people aged over 65 years presenting to the community health centre. The information sheet would encourage discussion of the issue of exercise during the forthcoming consultation.
- A steering committee would be established to oversee the program.
- Focus groups with older people from a range of cultures would be held to explore their perceptions of physical activity and barriers to participation. On completion of the focus groups, participants would be invited to become peer exercise leaders. Preferably a number of interested parties would be bi-lingual.
- A search of similar programs using the Falls Intervention Database would be conducted.

#### **Content**

A variety of classes would be offered to ensure participants could select or be referred into a class suitable for their particular needs. Each participant would be required to present a medical clearance certificate prior to commencing an exercise program. The certificate would also include details of individuals' existing medical conditions which would be forwarded to the instructor with the consent of the participant.

Participants would be assessed prior to their involvement in a class and at every four months of participation, for up to 12 months after original assessment. Participants would be provided with feedback about performance relative to previous assessments. Instructors would be trained to undertake the assessments which would include the Timed Up and Go test and the 'Functional Reach' test. Based on the results of the tests, the assessor would recommend participation in a high, medium or low intensity class.

#### **Evaluation and Outcomes**

In addition to participants' balance measure assessments and participation rates, falls and any subsequent injuries would be recorded every three months. This would enable a comparison between level of attendance and changes in balance assessments. Qualitative data would be collected in relation to participants' motivation to become involved in an exercise program and barriers they faced in getting started and maintaining their commitment to the program.

**Sustainability**

A train the trainer model would be adopted to ensure the intervention was sustainable beyond the initial introduction of the program. Interested community health centre staff and fitness instructors would be trained to undertake and record the initial assessments and to conduct the classes of varying intensity. They would train other staff and peer exercise leaders.

# 1. Introduction

Falls among older Australians have been acknowledged as a major public health problem, particularly from the late 1980s. However, there has been no systematic attempt, until recent years, to identify trends in the falls data longitudinally. The establishment of national and state targets for falls-related mortalities and hospitalisations in the early 1990s has seen this process develop. Trends earlier than this in Australia have not been reported.

A further issue, which has not been addressed to date, is the integration of data from a range of sources to identify the overall magnitude of the problem of falls in older people. The major emphasis has been on falls-related mortality and hospitalisation data. Even though fallers in these categories reflect the most serious falls and, in terms of hospitalisations, those which consume the largest proportion of the 'up front' health care costs, they only represent approximately 10% of older fallers overall.

There are hidden costs associated with many of the remaining 90% of fallers who do not sustain serious injuries or death from their fall. Many experience injuries that are not considered to be severe but may still impact on functional abilities. Furthermore, loss of confidence in mobility (also termed 'fear of falling') is prevalent in many fallers, including those who do not sustain injuries. This can be associated with a reduced activity level, general deconditioning and increased risk of further falls. The long term implications of these issues include increased demand on health resources and increased risk of sustaining an injurious fall in the future. As such, these falls also warrant targeting in falls prevention programs.

Injury prevention and control was identified in the early 1990s as one of the National Health Priority Areas (NHPAs) (Australian Institute of Health and Welfare (AIHW), 1997). National targets were set for reductions in rates of falls-related deaths and hospitalisations. In 1994, the then Victorian Department of Health and Community Services produced a report titled *Taking Injury Prevention Forward: Strategic Directions for Victoria*. This report set local targets for reducing falls-related deaths and hospitalisations (in addition to targets for other common forms of injury) and identified strategies to achieve these. This national and state focus on falls prevention, in conjunction with an increase in falls-related research in Australia and overseas, has translated into the development of many and varied falls prevention programs throughout Australia during recent years.

A range of falls prevention programs has been implemented in most regions in Victoria as part of the 'Foothold on Safety' initiative of the Victorian Department of Human Services. Most of the programs included in the review were introduced after 1994, with the majority implemented in 1998. Therefore, although the impact of these interventions on falls rates are not yet likely to be discernible, the programs can be expected to influence falls trends over the next several years.

## 1.1 Effectiveness in Falls Prevention

Effectiveness in falls prevention encompasses a range of factors, including measures of morbidity and mortality, changes in knowledge levels related to falls risk factors and health care costs. Nevertheless, program effectiveness is difficult to measure because there are different opinions on what constitutes success (Department of Human Services, 1998). In a discussion paper prepared for the National Public Health Partnership, Rychetnik and Frommer (2000, p. 3) describe three key principles of evidence-based practice:

- It is important to know whether public health interventions are effective and do more good than harm.
- The benefits and costs of public health interventions should be described and evaluated so they can be weighed against other options for the use of resources.

- People who make (or are affected by) evidence-based decisions about public health interventions should be aware of the strengths, weaknesses and limitations of the available evidence.

Consideration of these principles will enable planners and funders of falls prevention interventions to identify the most effective approach that will ultimately lead to improved health outcomes. Health promotion strategies that are evidence-based and result in positive health outcomes are, furthermore, achieving value for money.

## 2. Rationale for Conducting the Review

### 2.1 The Epidemiology of Falls among Older People

Falls are common occurrences for older people. Studies in the United States, United Kingdom, New Zealand, Canada, France and Japan have all reported a falls rate of up to approximately one in three for older people aged 65 years and over living in their own home (Campbell et al., 1989; Cummings et al., 1995; Dargent-Molina et al., 1996; Nevitt et al., 1991; O'Loughlin et al., 1993; Prudham & Evans, 1981; Tinetti et al., 1988; Yasumura et al., 1996). Some variations are evident, but in many cases these can be attributed primarily to differences in sampling, retrieval of falls information (prospective or retrospective) and definitions of falls or injuries. Although these studies range from 1981 to 1996, representing data from a number of countries, there are strong similarities in the falls rates. Injury rates (usually self-reported, including mild to severe injuries) ranged from 46% to 60%. Approximately 2% of all falls resulted in hip fractures in these samples.

Most studies identified an increased rate of falls with increasing age (Blake et al., 1988; Campbell et al., 1981). The vast majority of falls do not cause serious injury and do not warrant hospitalisation.

#### 2.1.1 Mortality Due to Falls

Unintentional injury from any source is the most common cause of death in older people in the United States, of which falls is the most common cause (Nevitt, 1997). These figures may underestimate the actual rates due to some misclassification. This may partially be as a result of complications from falls, such as pneumonia, which contribute substantially to some falls-related deaths.

Trends in falls-related mortality rates identified in several international studies indicate a gradual reduction over the past 20–30 years (Kannus et al., 1999; Nevitt, 1997). This trend appears to have plateaued over recent years. Improvements in acute medical care of those suffering serious falls-related injuries and requiring hospitalisation are likely to be a significant reason accounting for much of the reduction in mortality.

Mortality rates in the first two months following hip fracture have been shown to be high compared to the mortality of the general population. After the first two months, the mortality rates between the two groups are comparable (Dahl, 1980).

The death rate from falls for females aged 75–84 is almost five times as high as for females aged 65–74 years (Baker & Harvey, 1985). A similar distribution was reported for males, although the rates were lower. This highlights the effect of increasing age and/or the increasing number of comorbidities on the outcome of severe falls. Another factor associated with increased mortality has been the occurrence of a 'long lie' (defined as being unable to rise from the ground/floor surface – with or without assistance – for more than an hour after a fall) (Wild et al., 1981a; Wild et al., 1981b).

Injury is a major cause of death in Australia, accounting for 6% of all deaths in 1996 (AIHW, 1998). Mortality data for Victoria show similar patterns (Watson and Ozanne-Smith, 1997). Accidental falls account for 15% of all injury-related deaths and this proportion is considerably higher for older people. Injury mortality rates have declined over the past 25 years, as have mortality rates from other causes, resulting in little change in the proportion of deaths due to injury (AIHW, 1998).

## 2.1.2 Morbidity Associated with Falls

### 2.1.2.1 Serious Injuries Requiring Hospitalisation

Incidence of serious injuries as a result of falls among older people has ranged from 2% (O'Loughlin et al., 1993) to 23% (Tinetti et al., 1995). However, the term 'serious injuries' has rarely been well defined and, in most studies reviewed, is not limited to those injuries requiring hospitalisation. Nonetheless, most older people with lower limb fractures and a majority of those with moderate to severe soft tissue injuries (for example, large lacerations or serious joint strains) would require at least an assessment in a hospital emergency department and most likely a hospital admission. Over half of all people aged 65 years or over attending an emergency orthopaedic ward in Spain had a fall as the precipitating factor leading to attendance at the ward (Lazaro et al., 1996). Of these, 21% were admitted to the hospital for subsequent management.

The long term consequences of severe injuries from falls can be significant. One of the most severe falls-related injuries an older person can sustain is a hip fracture. Between 10–50% of older people sustaining a hip fracture do not regain their pre-fracture level of personal or instrumental Activities of Daily Living at 12 months (Magaziner et al., 1990).

In Australia, although most falls do not result in injuries that require hospital care, falls have accounted for 4% of all hospital admissions in persons aged 65 years and over and 69% of all injury-related hospitalisations in this age group (Day et al., 1994). In Victoria, falls were the leading cause of non-fatal injury in 1993–94 resulting in more than 23,000 hospitalisations and more than 105,000 non-hospitalised injured persons (Watson and Ozanne-Smith, 1997).

Although people aged over 65 years account for 12% of the Victorian population, this group accounts for 22% of the direct cost of injury, with falls being the major cause of injury in this age group (Watson and Ozanne-Smith, 1997). The incidence of hospital admissions as a result of falls increases exponentially with age (Lord, 1990). A review of New South Wales hospital admission rates for hip fracture up to 1990 identified that age-adjusted rates for both males and females were comparable to the rates in the United States and New Zealand (Lau, 1993).

### 2.1.2.2 Other Injuries

Studies have cited that injuries occur in 46–60% of falls (O'Loughlin et al., 1993; Nevitt et al., 1991). Given that approximately 10% of falls cause serious injuries (those most likely to lead to hospitalisation), the remainder of these falls injuries would be expected to be managed either by the General Practitioner (GP) or by the individual themselves (or with family assistance) without seeking medical attention. In a large prospective study, Tinetti et al. (1995) identified that 68% of fallers who did not sustain a serious injury did report a minor injury. Serious injury in this study was defined as:

- a/ fractures and joint dislocations;
- b/ head injuries resulting in loss of consciousness and hospitalisation;
- c/ other joint injuries or sutured lacerations which resulted in hospitalisation or decreased activity; and
- d/ internal injuries resulting in hospitalisation - rating based on the Abbreviated Injury Scale Score (MacKenzie et al., 1985).

Another common, but often undetected, consequence of a fall is loss of confidence in mobility or 'fear of falling'. Fear of falling has been identified as the most common fear among older people (25%) (Walker & Howland, 1991). One of the long term implications of the presence of fear of falling or loss of confidence in mobility is its association with reduced activity level. This can lead to reduced muscle strength, increased balance impairment and gait problems.

## 2.2 Health Care Costs Associated with Falls

The health care costs associated with falls and falls-related injuries among older people are substantial. The most obvious direct cost is associated with morbidity due to fractures and other serious injuries requiring hospitalisation. With regard to length of hospital stay and associated costs, hip fracture accounts for the highest proportion. Average duration of acute hospitalisation has ranged from 10 to 17 days in different studies with length of hospital admission increasing with increasing age (Farnworth et al., 1994; French et al., 1995; Kramer et al., 1997). Following acute hospitalisation, a period of inpatient rehabilitation is often required for an average of two to four weeks (Farnworth et al., 1994; French et al., 1995; Kramer et al., 1997).

Recent programs have successfully reduced inpatient length of stay, supplementing early home discharge with home-based therapies (Farnworth et al., 1994; Sikorski et al., 1985; Sikorski & Senior, 1993). Even after discharge home, these people often require moderate resource utilisation in terms of meals on wheels, home help, district nursing and ongoing therapy. Total health care expenditure on the management of osteoporotic hip fractures in the USA in 1995 was estimated at US\$8.68 billion (Ray et al., 1997). Australian data from 1990 estimated the average cost of conventional management of older people with hip fracture to be \$AUD11,060 per patient, although these costs reduced to \$AUD9,280 per patient with an early discharge management program (Farnworth et al., 1994).

While the costs associated with serious injury or fracture are the most obvious to consider, there are other indirect costs that need to be addressed in determining the total cost of falls. These include loss of potential income (for people aged 65 years and over who were continuing to work until a serious fall) and all health care costs (acute, rehabilitation and community services) related to the management of falls-related injuries. Fildes (1994) estimated the morbidity costs associated with falls among those aged 55 years and over to be \$582 million in Victoria annually and \$2,369 million across Australia. This may underestimate the true cost, particularly in terms of those who have numerous minor falls over a number of years. These falls may not result in any serious injuries, but gradually cause changes in activity level, reduced confidence in mobility and ultimately an increased need for supportive services. A further cost is associated with falls being a common reason for admission to residential care settings.

## 2.3 Falls Prevention Programs

### 2.3.1 Risk Factors

Many risk factors have been identified for falls and falls injuries in older people. In broad terms, factors contributing to falls can be considered as:

- Intrinsic (or host), which includes age-related changes in the balance systems as well as pathology in any component of the balance system. Medications and their side effects (such as dizziness) can also be considered under the umbrella of intrinsic falls risk factors.
- Extrinsic (or environmental/situational), which includes objects or circumstances contributing to falls risk, such as uneven pavement, slippery surfaces and poor lighting.

Many falls are due to a combination of both intrinsic and extrinsic falls risk factors. Falls prevention programs may target intrinsic falls risk factors, extrinsic falls risk factors or both.

Falls intervention programs may target any one or more of the intrinsic or extrinsic falls risk factors. Programs that target a single risk factor are termed single interventions and include:

- Home assessment and modifications to reduce environmental hazards within the home.
- Public safety audits, which systematically identify and respond to environmental hazards outdoors.

- Exercise or physical activity.
- Medication reviews.
- Vision assessment and modification.
- Education programs highlighting falls risk factors and strategies to minimise risk.
- Feet and footwear review.

Approaches to falls prevention may involve a single intervention, incorporate two or more interventions (multi-factorial) or identify those at risk of falls and target falls prevention strategies to the identified risk factors for the individual.

### **2.3.2 Effectiveness of Falls Prevention Programs**

Many intervention programs conducted among older people demonstrate that a specific intervention can have beneficial effects on the risk factor being targeted. For example:

- Muscle strengthening programs can cause significant improvements in muscle strength in older people (Agre et al., 1988; Frontera et al., 1988; Skelton et al., 1995).
- Balance training programs can improve balance abilities in older people (Johansson & Jarnlo, 1991).
- Education programs regarding falls risk have resulted in improved knowledge of falls risk factors (van Beurden et al., 1998).
- Home hazard reviews have resulted in reduced hazards within the homes of older people at risk of falling (Stevens et al., 1992).

Exercise programs have often incorporated a range of exercise types including strength, balance, flexibility and cardiovascular exercises. A number of these programs have been shown to improve outcomes on these health indicators (Bravo et al., 1996; Lord & Castell, 1994; Lord et al., 1996). Exercise programs in water (hydrotherapy) have also been shown to have positive effects on balance and muscle strength in older people and lead to improvement in reaction time (Lord et al., 1993).

However, relatively few studies have investigated the effect of their intervention on falls or falls injury rates. Reasons include that falls are variable and relatively infrequent events and to monitor the effect of a program on falls would require a longitudinal study with least six to 12 months follow-up.

The following interventions have been shown to be effective in at least one randomised controlled trial in reducing falls or falls injury rates in community samples of older people (Commonwealth Department of Health and Aged Care, 2000; Table 1):

- Exercise (tai chi, physiotherapy home exercises, combined strength and endurance training).
- Psychotropic medication withdrawal.
- Home assessments conducted by occupational therapists.
- Vitamin D<sub>3</sub> and calcium supplementation.
- Home health checks by trained volunteers.
- Multiple intervention programs.

**Table 1: Evidence of Effectiveness of Falls Interventions in Community Dwelling Older People (Commonwealth Department of Health and Aged Care, 2000). Listed studies are randomised controlled trials demonstrating significant reduction in falls or falls related injuries.**

Interventions	Falls Risk Factors											
	Chronic Medical Conditions	Environmental Hazards	Reduced Activity	Reduced Balance	Reduced Muscle Strength	Poor Vision	Cognitive Impairment	Poly-Pharmacy	Osteoporosis	Low Body Mass Index	Depression	Other
Education		A	A						A	A		
Exercise												
<i>Strength</i>				B	B							C,D,E
<i>Balance</i>				F								C,D,E
<i>General Exercise</i>				B	B				G			
Medical												
<i>Screen</i>												H
<i>Medication</i>								E				
Environment		I										
Sensory									C,J			
Injury Minimisation												
Multiple Strategies	K,L	K,LM	L,M	K,L	K,L	K,M		K,L,M				

**References cited:**

- |                           |                                 |                         |                        |
|---------------------------|---------------------------------|-------------------------|------------------------|
| A: Hornbrook et al., 1994 | E: Campbell et al., 1999b       | I: Cumming et al., 1999 | M: Wagner et al., 1994 |
| B: Buchner et al., 1997   | F: Wolf et al., 1996            | J: Chapuy et al., 1992  |                        |
| C: Campbell et al., 1997  | G: McMurdo et al., 1997         | K: Close et al., 1999   |                        |
| D: Campbell et al., 1999a | H: Carpenter & Demopoulos, 1990 | L: Tinetti et al., 1994 |                        |

In a systematic review conducted by the Cochrane Collaboration, multiple risk factor identification and management was shown to result in reduced falls rates (Gillespie et al., 1998; Jones, 1998). The review concluded that 'untargeted interventions (that is, those not based on assessment of individual risk) of exercise alone, health education alone, or health education plus exercise did not reduce falls' (Jones, 1998, p. 69). More recent studies that were not included in the Cochrane review have demonstrated significant benefits of exercise as a single intervention (Campbell et al., 1997; Buchner et al., 1997). Similarly, other recent successful randomised controlled trials not in the Cochrane review include home assessments conducted by occupational therapists (Cumming et al., 1999) and a comprehensive screening and management process by a doctor. This is in combination with an occupational therapy home hazard assessment for older people presenting to an Emergency Department after a fall (Close et al., 1999).

## **2.4 Scope of the Current Review**

In summary, falls among older Australians living in their own home are common and can have significant cost to the individual and the community in terms of death, pain, disability and handicap, reduced confidence and activity, as well as financial burden. Many falls prevention programs have been developed in recent years which aim to reduce the frequency and severity of falls, as well as addressing a range of falls risk factors. However, much of this work has occurred in isolation, with minimal communication beyond the local area of development. As a consequence, there can be a duplication of effort; lack of communication about the strengths and weaknesses of programs; and minimal evaluation and reporting of outcomes.

The major aims of this review are:

- To develop a critical appraisal system for application to falls prevention programs.
- To critically appraise the community-based falls prevention programs identified.
- To identify a means to enable access to the information derived from these processes.
- To develop a database of recent community-based falls prevention programs in Australia.

## 3. Methods

### 3.1 Program Review Procedure

There were several stages involved in the conduct of the literature review, a number of which occurred concurrently:

- A review of the epidemiology of falls in the areas of mortality, falls-related hospitalisations and injuries, and health care costs associated with falls.
- Identification of Australian falls prevention programs.
- Development of a questionnaire and evidence-based evaluation guidelines.
- Telephone interviews with key individuals involved with each program.
- Collection of resources developed by individual programs.
- Critical appraisal conducted by the multidisciplinary research team of each program using the evidence-based evaluation guidelines.
- Development of the falls prevention program database.

### 3.2 A Review of the Epidemiology of Falls

A detailed discussion of the findings from this review is in Section 2.1 The Epidemiology of Falls among Older People.

#### 3.2.1 Falls-Related Mortality Data

Data on the number of deaths due to falls for each year from 1921 to 1996 was obtained from the Australian Bureau of Statistics (1998). Falls deaths were classified by gender (male, female) and five-year age groups (65–69, 70–74, 75–79, 80–84, 85+) and coded according to the International Classification of Disease (ICD) used at the time.

Data on the number of deaths due to falls in Victoria and South Australia for each year from 1988 to 1997 were also provided by the Australian Bureau of Statistics (1998).

#### 3.2.2 Falls-Related Hospitalisations

Falls-related hospitalisation (also termed 'separation') data was obtained from the National Hospital Morbidity Database at the AIHW. Data was provided on the number of persons aged 65 years and over discharged from Australian public hospitals for each of the financial years from 1993–94 to 1997–98 inclusive, where hospitalisation occurred as a result of an accidental fall (ICD-9 codes 880–888). National data has not been collected in a systematic manner prior to this time. The data were provided for males and females aged 65 years and over by five-year age group.

In Victoria, the rate of hospitalisations is reported as a separation rate, that is, the number of discharges from public hospitals where the hospitalisation was as a result of accidental falls (ICD-9 codes 880.0–888.9). These data were extracted from the Victorian Inpatient Minimum Database (VIMD) excluding those admitted to private hospitals and those readmitted within 30 days. In contrast to the national data, the VIMD data includes all hospitalisations where the primary or subsequent ICD-9 code included that of accidental fall. The number of hospital separations was obtained for each financial year between 1988 and 1997 (for example, 1988 refers to the financial year ending 30 June 1988).

In South Australia, the Department of Human Services, South Australian Health Commission, provided the number of persons aged 65 years and over discharged from public hospitals for each financial year from 1989 to 1997 inclusive, where the hospitalisation was as a result of accidental falls (ICD-9 codes 880.0–888.9). The data include hospitalisations where the primary or secondary ICD-9 code was for an accidental fall. This includes readmissions within 30 days of initial separation.

### **3.2.3 Community-Based Data—Falls-Related Mortality and Hospitalisations**

Data from two large scale community-based studies in Australia were made available to the project team. The Health Status of Older People (HSOP) project was conducted by the Lincoln Gerontology Centre, LaTrobe University, in collaboration with the National Ageing Research Institute (NARI) (Kendig et al., 1996). The Australian Longitudinal Study of Ageing (ALSA) project was conducted by the Centre for Ageing Studies, Flinders University South Australia, in collaboration with the Centre for Demographic Studies, Duke University, North Carolina.

## **3.3 A Review of Falls Prevention Programs**

### **3.3.1 Identification of Falls Prevention Programs**

A number of strategies were employed to identify community-based falls prevention programs which have been implemented or maintained in Australia throughout the last ten years, including:

- Examining the research literature reporting on the implementation and effectiveness of interventions.
- Reviewing a number of Web sites, in particular health department sites in each State and Territory, and directly contacting relevant government agencies.
- Reviewing projects funded under the Commonwealth Department of Health and Aged Care (formerly the Department of Health and Family Services) Healthy Seniors Initiative.
- Searching existing databases such as:
  - The Health Education and Promotion System (HEAPS) developed by Prometheus Information (ACT, Australia)
  - The Injury Prevention Program Database developed by University of Queensland (<http://www.spmed.uq.edu.au/aipd/Home.asp>).
- Snowballing, where contact with one organisation led to contacts with other organisations.
- Attendance and presentation of information concerning the proposed database at the Australian Association of Gerontology Conference (Melbourne, 1998), the Public Health Association Conference (Hobart, 1998) and the National Injury Prevention and Control Conference (Brisbane, 1999).
- Promotion of the proposed database in various newsletters relevant to aged care, injury surveillance and occupational therapy.

### **3.3.2 Inclusion Criteria for Falls Prevention Programs**

Although a large number of programs were identified in the review, not all were considered relevant for inclusion. Inclusion criteria for programs were:

- Community-based programs (that is, programs targeting older people not living in residential facilities).
- Programs identified by the auspicing organisation as a falls prevention program.
- Programs with a primary aim of achieving a reduction in falls and/or a reduction in risk factor(s) associated with falling.

Large scale research projects with some potential application in the community were included. Once a program was identified, a letter of introduction was forwarded to each organisation outlining the purpose of the contact and describing the nature of the review. A request for a telephone interview was also included in this letter. In most cases, organisations were able to nominate a suitable person to interview.

### **3.3.3 Questionnaire Development, Telephone Interviews, Collection of Program Resources**

A comprehensive questionnaire was developed to collect information relating to falls prevention programs and health promotion initiatives generally. It included aspects related to the design, development, content, implementation, sustainability and evaluation of falls prevention programs. The questions were based on research evidence and clinical experience and were also informed by the development of the evidence-based evaluation guidelines.

A telephone interview was conducted with a key person from each program, during which the questionnaire was completed. A copy of the completed questionnaire was sent to each respondent to confirm the accuracy of the information collected.

Each organisation was asked to provide a copy of any available documentation and resources generated by their program. These resources were used to inform the critical appraisal.

### **3.3.4 Evaluation Guidelines Rating System**

Evidence-based evaluation guidelines were developed to inform the critical appraisal of each falls prevention program. The guidelines were based on the literature regarding the effectiveness of the various intervention types and the association between falls and a number of identified risk factors (Campbell, 1997; Clemson et al., 1996; Dargent-Molina et al., 1996; Garner et al., 1996; Gillespie et al., 1998; Hahn et al., 1996; Hornbrook et al., 1994; King & Tinetti, 1996; Lord et al., 1995; Lord et al., 1996; Monane & Avorn, 1996; Nevitt et al., 1989; Reinsch et al., 1992; Rubenstein et al., 1990; Thompson, 1996; Tinetti et al., 1994; Tinetti & Speechley, 1989; van Beurden et al., 1998; Wolf et al., 1996).

The evaluation guidelines were informed by expert opinion and best practice principles drawn from a multidisciplinary reference group which was established to review and comment on a draft version of the evaluation guidelines. Members of the reference group included:

- Researchers with experience in injury prevention.
- A representative from an older adult organisation.
- Government representatives.
- Individuals directly involved in implementing falls prevention programs from both a metropolitan and rural perspective.

The evaluation guidelines were divided into four sections: program design and development; program content; program sustainability and institutionalisation; and program evaluation and effectiveness. A rating system was applied to each section of the

evaluation guidelines. There was a maximum number of points that each falls prevention program could be awarded in each section. Where a program received the maximum number of points in any one section it was awarded five stars for that section. For example, a total of ten points was achievable for the program sustainability and institutionalisation section – obtaining six points was equivalent to a three star rating.

A five star rating system was adopted because it is a commonly understood method of rating the quality and extent of a product or service. The five star rating system was applied to each section of the evaluation guidelines and enabled the comparison of like programs across a number of dimensions.

Although cost-effectiveness is an important consideration in the development of a falls prevention program, a high proportion of programs were unable to cost their program for a range of reasons. Cost-effectiveness was, therefore, excluded from the evaluation guidelines.

### **3.3.5 Inter-Disciplinary Appraisal of Past and Present Programs**

On completion of the questionnaire and receipt of available program documentation and resources, the critical appraisal of each program was conducted by a multidisciplinary team from the Public Health Division at NARI. Each appraisal was conducted by a minimum of two people with experience in falls prevention work. Most often the appraisal was conducted by a research nurse and a physiotherapist/falls researcher. The completed questionnaire and accompanying resources were reviewed independently by the members of the appraisal team using the evidence-based evaluation guidelines. The team then met to work through the evaluation guidelines and reach a consensus appraisal.

### **3.3.6 Development of the Falls Intervention Database**

A database of falls prevention programs was developed and is available on the Internet as a separate resource. This contains the completed questionnaires along with a brief summary of each program, contact details for each organisation, and outcomes of the critical appraisal of each program. The database also contains information regarding programs that do not specifically target falls prevention but do address one or more risk factors for falling, as well as information relating to community-based falls prevention programs where a contact person is no longer available.

## 4. Results and Discussion

A diverse range of community-based falls prevention programs has been implemented in Australia over the past ten years ranging from shoe parades and home safety parties to specialised falls clinics. This chapter explores the various attributes of these falls prevention programs and the demonstrated impact of the interventions adopted on falls rates.

A total of 131 programs targeting older people not living in residential facilities have been included in the review. The distribution of falls prevention programs throughout Australia is detailed in Table 2.

**Table 2: Number of Programs per Australian State and Territory**

State/Territory	No. of Programs (n= 131)	%
New South Wales	54	41.2
Victoria	39	29.8
Queensland	10	7.6
Australian Capital Territory	9	6.8
Western Australia	8	6.1
South Australia	6	4.6
Tasmania	4	3.1
Northern Territory	1	0.8

In NSW, every area health service has been involved in the implementation of falls prevention initiatives for a number of years. More recently in Victoria, a range of falls prevention programs has been implemented in most regions as part of the Foothold On Safety initiative of the Victorian Department of Human Services.

Most programs included in the review were introduced after 1994, with the majority implemented in 1998 (Table 3). Therefore, the impact of these interventions on falls rates is not likely to be discernible at this stage. However, the programs can be expected to influence falls trends over the next several years.

**Table 3: Years in Which Falls Prevention Programs Were Implemented Nationally and in Victoria**

Year Program Introduced	No. of Programs (n= 131) (Australia)	No. of Programs (n=39) (Victoria)
1999	2*	0
1998	41	19
1997	14	4
1996	19	2
1995	19	3
1994	8	3
1993	4	1
1992	10	4
1991	3	0
1990	5	0
1989	1	1
Pre 1989 and on-going	3	1
Unknown	2	1

\* Identification of new programs to be included in the database stopped in March 1999. As such, the 1999 number of new programs is incomplete.

#### 4.1 Factors Leading to Program Development

A range of factors was identified by respondents as motivating the development of their falls prevention program. Programs most commonly emerged in response to a health professional initiative (55 programs). Such programs have been repeatedly driven by a perceived need identified by a health professional through their interaction with older people who present with a history of falls or who are at risk of falling. Government initiatives (36 programs) and statistical data reporting on the incidence of falls (40 programs) were frequently also associated with the instigation of programs. The outcomes of a formal needs assessment, such as a survey of local residents or service providers, or the examination of data specific to a local area, preceded a minority of programs (20 programs). The availability of funding has similarly been associated with the instigation of a falls prevention program on an infrequent basis (21 programs). A combination of factors has predominantly resulted in the development of falls prevention initiatives (64.1%).

#### 4.2 Awareness of Falls Prevention Programs

The majority of organisations involved in the development and implementation of falls prevention programs had some awareness of other falls specific programs (113 programs). A number of organisations indicated that a search for existing programs was one of their initial steps. Less than 50% of respondents indicated that they were aware of more than four other falls prevention programs (64 programs).

In a number of cases, resources developed in earlier falls prevention programs were adopted by others. For example, a home hazard checklist developed by the NSW Health Department entitled *Take Steps to Prevent a Fall*, has been widely used in NSW and in other States. The resources from the program implemented by the Northern Rivers

Institute for Population Health and Research (formerly North Coast Public Health Unit), entitled *Stay On Your Feet*, have been utilised extensively by other programs. Video and resource packages developed independently by the Australian Pensioners and Superannuants Federation and the HACC Resource Unit (Queensland) have also been incorporated into a number of falls prevention programs.

### 4.3 Target Groups

The primary target group for the majority of falls prevention programs has been older people. People over the age of 60 and 65 were frequently selected as the target population, which is consistent with much of the falls literature. In contrast, the age groups of 50, 55, 70 and 75 and over have been targeted less frequently. A large number of programs do not target a specific age group (Table 4).

**Table 4: Age Groups Targeted by Programs (Includes Programs Reporting That at Least One of Their Target Groups Was Older People)**

Age Group	No. of Programs Targeting Older People (n= 125)
50+	9
55+	5
60+	33
65+	25
70+	8
75+	3
Age not specified	42

A number of organisations indicated that targeting older people proved difficult because older people often do not see falls prevention as relevant to themselves and do not consider themselves to be at risk if they have not fallen. A challenge common to health promotion programs is the perceived need for the program by the target population.

A number of programs targeted older people who have fallen or were at risk of falling. The latter have been defined in several ways including older people receiving home and community care services or those presenting to their GP or community health centre with a mobility impairment or other risk factor for falling (Table 5). A number of organisations reported difficulties accessing the frail aged or those not part of an established group, particularly in relation to interventions incorporating education strategies.

**Table 5: Frequency of Programs Targeting At-Risk Older People**

Target Group	Programs Targeting Fallers and/or at-Risk Groups (n= 49)
Fallers	9
At-risk	16
Fallers and at-risk	24

A small number of programs did not directly target older people (6 programs). Other target groups included health professionals such as GPs, home care workers, community health nurses and allied health professionals working with older people. The majority of programs had multiple target groups, acknowledging the roles of a range of health professionals in falls prevention (Table 6).

**Table 6: Frequency of Multiple Target Groups**

Number of Target Groups	Total No. of Programs (n= 131)
1	37
2	30
3	32
4	8
5	7
> 5	17

#### **4.4 Consideration of Language and Cultural Background of the Target Audience**

The majority of programs reported having considered the language and cultural needs of their target audience in the development of their program (88 programs, 67.2%). Over 50% of these programs provided for a range of ethnic groups (49 programs). This has been achieved in a number of ways including translating resources into appropriate community languages, providing an interpreter service, encouraging family and friends to participate, training bilingual peer educators and considering the target groups' cultural background in relation to the promotion of physical activity.

Many organisations stated that they do not have a significant number of people from non-English speaking backgrounds (NESB) within their target population and have therefore not considered it necessary to ensure that their interventions specifically target these groups. In relation to the translation of resources, where demand for these resources was acknowledged, the costs associated with this was considered to be prohibitive by a number of organisations.

#### **4.5 Program Objectives**

The majority of falls prevention programs had multiple objectives (90.8%). Seventy-three programs listed reduction in the incidence of falls as an objective, 55 programs aimed to reduce the incidence of injury associated with falling and, of these, 46 programs aimed to reduce both the incidence of falls and associated injury. Raising the awareness and knowledge of falls risk factors amongst the target audience was cited as an objective for 84 programs.

Of the 84 programs which had measured the impact of their intervention, 34 (40.5%) concluded that they achieved an increase in awareness and knowledge of falls risk factors. With regard to the 72 programs which aimed to reduce falls, 22.2% (16) stated that this was achieved. A significant number of organisations reported that they were unable to measure the impact and outcome of their intervention. Lack of resources was raised by a number of organisations as an impediment to effective evaluation.

## 4.6 Program Accessibility

The accessibility of a program can potentially impact on rates of participation – transport and cost were two key factors considered in the review. Transport was provided for all participants in 21 programs, some degree of transport was provided in 46 programs and limited transport was incorporated into the design of 25 programs. Limited transport refers to provision of transport for some aspect of the program or for a discrete population or depending on eligibility criteria.

Participation in the vast majority of falls prevention programs (103) incurred minimal or no cost. Cost was, therefore, not considered to be a significant impediment to participation. Participation rates were not readily known in the majority of programs, therefore a comparison between provision of transport, cost and participation could not be undertaken.

Thirty programs (23%) indicated that they had difficulty recruiting participants. The majority of these programs were education programs (21). Several health professionals indicated that they were concerned that older people were not identifying with the information provided, particularly if they had not previously fallen.

## 4.7 Involvement of Stakeholders

The involvement of stakeholders may or may not be as part of a formal steering committee. A steering committee was incorporated into the design of the majority of programs (84) with the target audience represented on 51 of these committees. The incorporation of a steering committee does not appear to have influenced the sustainability of the programs. Forty-five of the 84 programs (53.6%) with a steering committee were reported to be sustainable. In comparison, 26 out of the 41 programs (63.4%) without a steering committee were considered sustainable.

Focus groups involving members of the target group were incorporated into 59 of the 131 falls prevention programs (45.0%). Focus groups were adopted in the development of programs to gauge the existing knowledge of the target group and determine any barriers to participation or behaviour modification. They also formed part of the evaluation of some programs.

## 4.8 Promotional Strategies

The diverse range of promotional strategies adopted can potentially impact on the uptake of programs. The most successful or appropriate strategies are likely to vary between settings and geographical locations. Newspaper articles, predominantly in local papers, were the most common method of promotion (81). Letters (58), newsletters (55), radio (50), posters (47), presentations (47), pamphlets (42) and telephone calls (41) were also frequently adopted.

The number of promotional strategies adopted by an organisation does not appear to have contributed to the effectiveness of an intervention. On average, six different types of promotional strategies were adopted by organisations for programs which aimed to achieve a reduction in falls and were successful in achieving that aim. Similarly, an average of six promotional strategies were also adopted by organisations conducting programs which aimed to achieve a reduction in falls and were not successful in achieving that aim. Some of the more unique promotional strategies adopted include advertising on the side of milk cartons, which was one of the strategies adopted by the Northern Rivers Institute of Population Health and Research, NSW, and posters

featuring local residents in a rural area which was adopted by Bass Coast Shire and South Gippsland Shire.

## 4.9 Follow-Up

Addressing the follow-up of participants in the design of a program can contribute to a more comprehensive program evaluation. Seventy-five programs (57%) incorporated some form of follow-up. For most programs, this was undertaken as part of the evaluation and frequently only involved a sub-sample of all participants. Thirty-one programs reviewed all participants on more than one occasion post intervention. This was applicable for a number of home hazard programs where follow-up contact was made with participants to ascertain if any modifications had been made, as well as for individualised risk factor assessment programs where physical examinations were repeated.

## 4.10 Funding Sources

There are limitations associated with short-term funding, particularly in relation to programs having the capacity to evaluate the impacts of their intervention. The funding sources for the majority of programs were government departments (79), followed by funding being drawn from the core funding of an organisation (58). Sixteen programs used funding from both a government department and from their core funding. With regard to the use of core funds, a change in focus of a health promotion unit or increasing work demands on staff may have affected the capacity to evaluate the program. Sponsorship (10) and donations (6) supplemented the funding of a small number of programs. The majority of programs have ongoing funding or funding for at least two years (64.1%). Table 7 reports the duration of funding for programs.

**Table 7: Duration of Funding Periods**

Duration of Funding	No. of Programs Nationally (n= 131)	No. of Programs in Victoria (n= 39)
< 12 months	9	3
12 months	19	4
2 years	19	11
3 years	10	1
> 3 years	4	0
Other	4	1
Ongoing Funding	47	13
Unknown or Not Specified	19	6

## 4.11 Location of Programs

The distribution of falls prevention programs between metropolitan and rural areas is reported in Table 8. The majority had a metropolitan focus, although 27 addressed both metropolitan and rural communities. Within Victoria there was less of a disparity between number of falls prevention programs implemented in metropolitan and rural areas.

**Table 8: Location of Programs**

Location of Program	No. of Programs Nationally n= 131 (%)	No. of Programs in Victoria n= 39 (%)
Metropolitan	63 (48.1)	17 (43.6)
Rural	37 (28.2)	13 (33.3)
Both	27 (20.6)	8 (20.5)
Non-Specific	4 (3.1)	1 (2.6)

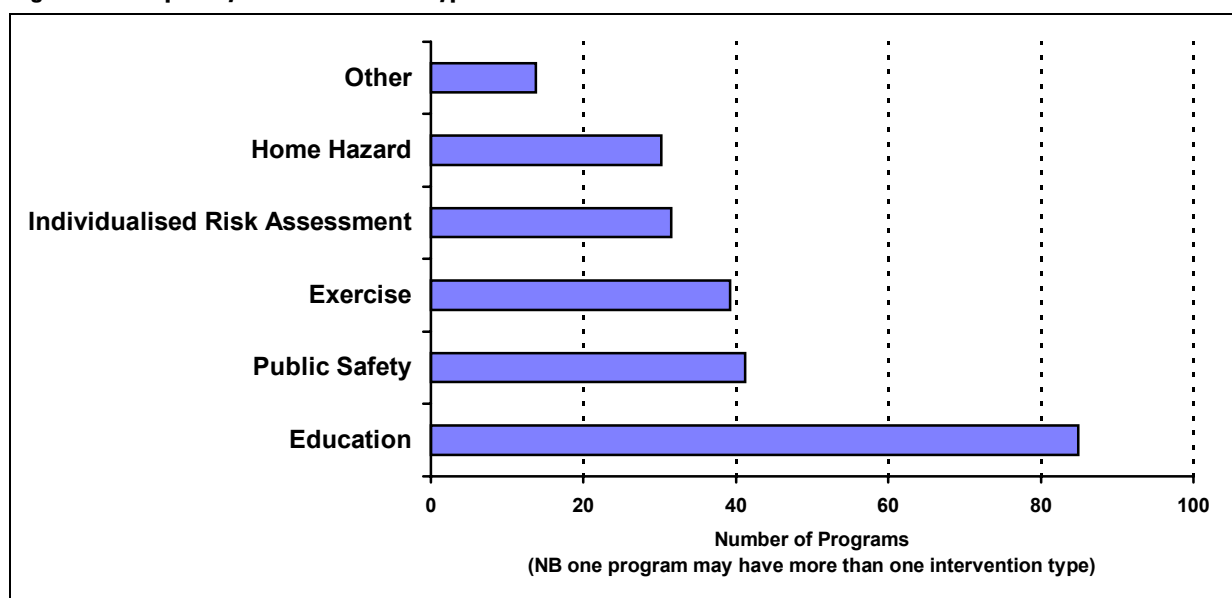
Although there is limited research evidence comparing falls rates and circumstances between metropolitan and rural regions, some respondents felt that there were important differences between these communities.

Organisations implementing programs in rural areas indicated that difficulties arose when raising the profile of services available to older people, because they may not have the capacity to subsequently meet the demands for that service. In one rural area, simply ensuring sufficient occupational therapy time was funded to conduct home hazard assessments and modifications was regarded as a falls prevention program in itself. In contrast, a strength identified by organisations implementing programs in rural areas was the existing networks that facilitated the implementation of programs.

## 4.12 Intervention Types

The frequency of use of the main intervention types is shown in Figure 1. Many of the programs incorporated two or more intervention types, with the most common intervention, alone or in combination, being an education program. The 15 programs listed as 'other' included programs such as the establishment of working parties to review falls data, or the surveying of local residents regarding factors associated with falls or research projects with a specific focus such as hip protectors.

**Figure 1: Frequency of Intervention Types**



While there is a degree of uncertainty regarding the most effective means of reducing falls, there is increasing data to suggest that multiple interventions more effectively reduce the incidence of falls than single interventions. A recent systematic review of falls prevention projects targeting older people living in their own home, which incorporated a randomised controlled design, identified multi-factorial and multi-strategic approaches as the most effective means of reducing falls (Gillespie et al., 1998).

The type of health professionals involved in implementing programs appears to have influenced the type of intervention adopted. For example, health promotion officers have been involved in the implementation of 32 falls prevention programs, 27 of which are education programs. Similarly, geriatricians have been involved in the implementation of 15 programs, 11 of which have been individualised risk factor assessment and management programs.

A multi-strategic approach has been adopted by most organisations (82). Education programs have been frequently implemented with a public safety program (35) and/or an exercise program (24). Individualised risk factor assessment and modification programs, while being multi-factorial and multi-strategic, have often been implemented with an education program (16 out of 33 programs) involving training GPs or other health professionals who are then responsible for undertaking the assessments.

#### 4.12.1 Risk Factors

A number of risk factors for falling have been identified in the literature. Falls are generally the result of a combination of intrinsic and extrinsic risk factors. Intrinsic risk factors include balance and vision impairment; extrinsic risk factors relate to environmental hazards such as ill-defined steps. Programs addressing a number of risk factors for falling are likely to meet the needs of a larger proportion of older people, compared with programs addressing a single risk factor for falling. The multi-factorial nature of falls has been well recognised and addressed by most falls prevention programs contained in the database. Table 9 lists a range of risk factors and the number of programs that addressed these factors.

**Table 9: Risk Factors Addressed by Falls Prevention Programs (Multiple Choice Permitted)**

Risk Factors Addressed by Programs	No. of Programs (n= 131)
Medications	107
Medical Conditions	100
Sensory Impairments	107
Foot Problems	101
Dizziness	96
Balance and Gait	108
Lower Limb Weakness	74
Inactivity	103
Home Hazards	107
Public Hazards	81
Fear of Falling	78
Nutrition	74

Other	31
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Thirty-two per cent of programs indicated that they had addressed all of the risk factors identified in Table 8 within their program. Less than 10% of programs addressed less than four risk factors for falling as part of their program.

#### 4.12.2 Education Programs

A range of formats and settings has been adopted by organisations to deliver falls prevention education. Common locations for falls prevention education programs targeting older people include meeting places of existing older adult groups, such as senior citizens centres. The success of peer educators in the *Stay On Your Feet* program implemented by the Northern Rivers Institute for Population Health and Research has motivated others to adopt a similar format.

A peer education model has been incorporated into 16 falls prevention programs, however, only two programs have involved older people as the sole educators. Peer educators have usually worked alongside a health promotion officer (11) and/or an occupational therapist (7) and/or a community health nurse (5). The difficulty recruiting peer educators and the time constraints of peer leaders was cited as a problem by some organisations. Occupational therapists have been involved in 36 education programs, followed by health promotion officers (29 programs), physiotherapists (23 programs), community health nurses (17 programs) and project officers (16 programs). Frequently, education has been provided by a number of clinicians who each address specific risk factors for falling.

In relation to resources used and distributed as part of a falls prevention education program, home hazard checklists (52 out of 85 programs; 61.2%) and pamphlets (48 out of 85 programs; 56.5%) have been frequently used. Other resources include videos (39 out of 85 programs; 45.9%), posters (36 out of 85 programs; 42.4%), information sheets (35 out of 85 programs; 41.2%), overheads (34 out of 85 programs; 40.0%) and resource kits (28 out of 85 programs; 32.9%). The majority (85%) of education programs provided participants with resources containing contact details for local service providers and/or referral processes for occupational therapists and other allied health professionals. Localised home safety product lists have also been developed and distributed to enable participants to act on the information provided. Organisations involved in falls prevention education programs generally felt that the messages of falls prevention needed to be repeated and followed up, with isolated education being insufficient to modify behaviour.

#### 4.12.3 Structured Exercise Programs

There has been a trend towards falls prevention programs focusing on increasing exercise opportunities for older people. A range of exercise programs have been implemented which have focused on reducing risk factors associated with falling, such as balance and mobility impairments (39). Thirteen of the 39 programs (33.3%) incorporated a structured assessment of participants prior to their participation in an exercise program and reported having the capacity to tailor the program to the individual's needs. A structured assessment ranged from the completion of a medical clearance certificate by the participant's doctor, to a comprehensive assessment of balance, mobility, strength and functional ability conducted by the instructing physiotherapist.

Modification of programs to suit participants' needs included incorporating chair-based exercises, where appropriate, or advising participants to abstain from performing a particular exercise. Strengthening and balance exercises have been incorporated into 25 and 24 programs respectively. In general, a combination of exercise types has been adopted. Twenty-two of the 39 programs (56.4%) incorporated more than one type of exercise. Only a small number of programs incorporated home-based exercise (11 out of 39 programs; 28.2%).

Exercise programs have commonly been led by either a trained fitness instructor (19 programs) or a physiotherapist (13 programs). Five programs involved both, generally with the physiotherapist in a supervisory role. Older people have been involved in the delivery of 10 exercise programs, six of these in conjunction with a physiotherapist or an instructor. The majority of exercise classes were conducted over 30 minutes to one hour with generally less than 20 participants. The social component of exercise was reported by a number of organisations as greater motivation for ongoing attendance rather than the health benefits gained from the exercise.

#### **4.12.4 Home Hazard Assessment and Modification Programs**

A number of research projects evaluating the impact of home hazard modification on falls incidence have been conducted. There have been variations between the individuals conducting the home hazard assessment and the duration and type of follow-up factored into the project design. Occupational therapists have been involved in conducting home hazard assessments as part of falls prevention programs more than any other group (24 out of 32 programs; 75.0%). Community health nurses have been involved in nine home hazard programs. Both groups have usually used a structured assessment tool as part of this process. Home care workers have also been involved in assessing home hazards (five programs).

Older people were generally responsible for acting on the outcomes of the assessment (22 programs) in conjunction with the health professional involved in the assessment. A number of organisations reported that older people were resistant to changes such as the installation of hand rails, because it portrayed an image of dependence and detracted from the value of their home. Some organisations also reported that older people were found to have reversed modifications made.

To encourage older people to have their homes assessed, a number of organisations offered free home hazard assessments often in conjunction with the provision of a free home safety device such as a night light. The cost of modifications was cited by some organisations as a constraint on older people acting on recommendations. Some home hazard programs have been motivated by, and linked to, issues of occupational health and safety. This is in relation to the risk presented to workers who are caring for older people living in hazardous homes.

#### **4.12.5 Individualised Risk Factor Assessment and Management Programs**

This type of program involved a diverse range of initiatives. The most common initiative was a specialised clinic where participants were assessed by a number of clinicians. This intervention type also captured formalised falls assessment processes adopted by GPs and other health professionals.

Medical involvement has been incorporated into 20 of the 33 (60.6%) individualised risk factor assessment and management programs included in the review. Physiotherapists (22 programs) and occupational therapists (20 programs) were also commonly involved. Thirty-one of the 33 (93.9%) individualised programs involved a structured assessment

of participants by a clinician addressing specific risk factors for falling. Fourteen of the 23 (60.9%) individualised risk factor assessment programs, with more than one health professional involved in the assessment process, included routine coordination between those involved in the assessment to management plan.

The participant's GP was solely responsible for instigating the implementation of a management plan on completion of the assessment in nine programs; allied health professionals involved in the assessment process were solely responsible in 13 programs and were jointly responsible in seven programs. Older people were responsible for implementing a plan of action in 11 programs, although they did not have sole responsibility. Very few of these programs (nine out of 33; 27.3%) had formalised procedural guidelines and protocols detailing the assessment process and the roles of each clinician in that process. The absence of these protocols potentially may threaten the sustainability of this type of intervention due to staff turnover.

#### **4.12.6 Public Safety Programs**

Public safety programs encompass initiatives aimed at reducing hazards and have been motivated either partially or fully by the issue and incidence of falls in a specific public locality. Issues of public liability have driven a number of public safety initiatives. Seventeen of the 41 (41.5%) public safety programs contained in the review used a hazard reporting form enabling residents to inform their local council of the specific location of a hazard. When these forms were used they were available at a number of outlets including council offices, information centres and pharmacies. Twenty-eight of these programs conducted a public safety audit. Both older people and local council representatives were jointly involved in 17 programs incorporating public safety audits. In some cases, this has involved the simulation of a disability (for example, visual impairment) to enable council representatives to appreciate the impact of public hazards. Other public safety initiatives included either the establishment of an Access Committee or the incorporation of falls prevention onto the agenda of an existing Access Committee.

### **4.13 Program Sustainability and Institutionalisation**

The sustainability of health promotion programs is crucial if they are to be effective in the long term. Seventy-three of the 131 programs (55.7%) were considered by those directly involved in their maintenance to be sustainable. Thirty-two additional programs were designed to be sustainable but have only recently been implemented. Twenty-six programs were not sustainable because the programs were planned to run for a specific period of time or there was a lack of resources. A number of factors can facilitate the sustainability of a program, including the allocation of staff, funding or space in which to conduct the program.

Sustainability may also be achieved by incorporating processes into the routine activities of others. For example, the incorporation of a home hazard checklist into the assessment processes of community nurses was achieved by the Tropical Public Health Unit in Townsville. The ongoing availability of a program's resources beyond the completion of a project enables information to be continually imparted. The *Stay On Your Feet* book developed by Northern Rivers Institute for Population Health and Research has remained available for purchase since the completion of the project and continues to be widely used.

Although it is desirable that programs are sustained, it is also desirable that programs which are sustained continue to be effective. Programs need to incorporate processes for ongoing evaluation and review. The factors most commonly associated with a program's

sustainability are listed in Table 10. The majority of programs (88.4%) attribute their sustainability to two or more of the factors listed in Table 10.

The allocation of staff time and the incorporation of program duties into the position descriptions of staff, rather than the specific allocation of funds for falls prevention activities, have been identified as contributing to the sustainability of a number of falls prevention programs. As indicated in Table 9, a large number of programs (74) have the capacity to respond to the outcomes of their evaluation and a large proportion of these programs are required to submit evaluation reports on a regular basis indicating a formalisation of evaluation processes.

#### **4.14 Program Evaluation and Effectiveness**

The literature pertaining to the most effective means of reducing rates of falls among older people remains inconclusive. Therefore, it is desirable that organisations incorporate some form of evaluation into the design and implementation of the program. This will enable them to determine the impact of the intervention and modify it if there is no effect or an adverse effect is discovered. Eighty-five of the 131 programs (64.9%) in the review have conducted some form of evaluation and a further 33 programs (25.2%) are planning to undertake some evaluation. Thirteen programs (9.9%) have not conducted any evaluation and are not planning any evaluation.

**Table 10: Attributes of Sustainable Programs (Multiple Choice Permitted)**

Factors Associated with Program Sustainability	No. of Programs Nationally (n= 131)	No. of Programs in Victoria (n= 39)
Permanent Funding	25	11
Funding Available for > 3 Years	8	2
Permanent Staff	42	18
Program Duties Incorporated into Job Description	47	14
Permanent Space To Conduct the Program	29	11
Program Is a Core Activity of an Organisation	36	7
Program Part of an Organisation's Mission Statement	3	1
Aspects of Program Incorporated into Another Organisation's Core Activities	29	9
Policy Changes Have Occurred	19	8
Established Protocols for Inter/Intra Agency Cooperation	13	4
Ongoing Availability of Program Resources	48	13
Evaluation Reports Required on a Regular Basis	55	17
Capacity To Respond to Outcomes of Evaluation	74	24
Other	42	10

A variety of methods have been adopted by organisations to evaluate the effectiveness of their falls prevention program. The majority of programs, while being motivated by a desire to reduce the incidence of falling, acknowledge that they may be unable to demonstrate the impact of their particular intervention because of the evaluation methods they adopt and/or a lack of resources. Table 11 indicates the frequency with which the various evaluation methods have been adopted.

**Table 11: Methods of Evaluation (Multiple Choice Permitted)**

Evaluation Method	No. of Programs Nationally (n= 131)	No. of Programs in Victoria (n= 39)
Randomised Controlled Trial	10	1
Comparison Group	5	1
Pre and Post Evaluation	69	19
Post Evaluation	62	21
Other	16	5

The sources of data used to inform an evaluation will also impact on the strength of the conclusions. More than one source of data has been used by 67.2 % of programs. Prospective data was used solely by 21 out of the 131 programs (16.0%), compared with retrospective data which was used in the evaluation of 43 programs (32.8%). Forty-eight programs (36.6%) incorporated both prospective and retrospective data.

**Table 12: Sources of Data Used in the Evaluation Process (Multiple Choice Permitted)**

Sources of Data	No. of Programs Nationally (n= 131)	No. of Programs in Victoria (n= 39)
Hospital Admission Data	39	6
Service Record Audits	19	7
Surveys	25	5
Questionnaire - Falls Related	34	11
Questionnaire - General	32	12
Interviews	29	3
Focus Groups	16	1
Functional/Physical/Psychological Examination	23	7
Other	41	9

Impact and process evaluation has been more commonly used than outcome evaluation. Eleven of the 85 programs (12.9%) that evaluated their program concluded that they reduced the rate of falls and three programs reported reducing injury associated with falling. Six programs (7.0%) indicated they achieved both a reduction in falls rates and injury associated with falls. The most commonly reported result was an increase in the awareness and knowledge of falls by the target group (35 programs; 41.2%). Table 13 reports the level of evaluation achieved by organisations that provided the results of their evaluation.

Program outcomes were often reported at a state or regional level with the consequence that reductions in falls rates could not conclusively be linked to the impacts of an intervention at local level.

**Table 13: Type of Evaluation Reported**

Level of Evaluation Achieved	No. of Programs Reporting Results Nationally (n= 60)	No. of Programs in Victoria (n= 15)
Process Evaluation Only	0	0
Impact Evaluation Only	20	5
Outcome Evaluation Only	3	0
Process and Impact Evaluation	20	7
Process and Outcome Evaluation	0	0
Impact and Outcome Evaluation	5	0
Process, Impact and Outcome Evaluation	12	3

#### 4.15 Improving the Effectiveness of Programs

Organisations involved in falls prevention programs were asked how their program could have been more effective. More funding was cited by 43 organisations, more staff by 23 organisations and more time by 26 organisations, with many offering more than one method of improving their program. Other respondents reported that greater organisational capacity and the incorporation of a larger number of stakeholders in the development and implementation of the program may have improved the outcome.

## **4.16 Critical Appraisal of Program Outcomes**

Each program was rated for the four sections of the evaluation guidelines: program design and development; program content; program sustainability and institutionalisation; program evaluation and effectiveness. None of the falls prevention programs contained in the review obtained a five star rating in each of the four sections of the evaluation guidelines.

### **4.16.1 Program Design and Development**

The majority of falls prevention programs obtained a three star rating in the program design and development section of the evaluation guidelines, indicating that issues associated with the design and development of programs were generally well considered. None of the 131 falls prevention programs in the review obtained a five star rating for this section.

The most common reasons why many programs did not achieve a higher rating were because they did not target at-risk groups, they did not conduct a needs assessment, they did not provide transport for all participants or they did not incorporate follow-up of participants.

### **4.16.2 Program Content**

Programs addressing a range of high risk factors for falling and adopting a number of intervention types rated well if the specific components of the intervention also rated well. For example, a five star individualised risk factor assessment and management program rated highly in the program content section overall.

#### **4.16.2.1 Ratings of Falls Prevention Education Programs**

Falls prevention education programs rated well overall, with 74 education programs obtaining a three star rating or above. The distinguishing characteristics between a three star rating and a four or five star rating were the diversity and quality of the resources utilised, including the comprehensiveness and accuracy of the information and its relevance to falls prevention. Education programs incorporating a peer education model and targeting more than one group rated highly for this intervention type. In some cases, resources used for the education program were no longer available or not provided for review resulting in these programs not being rated for this section.

#### **4.16.2.2 Ratings of Structured Exercise Programs**

A number of components in the structured exercise section of the evaluation guidelines impacted on programs of this type attaining a four or five star rating. Programs incorporating balance exercises rated more highly than general exercise programs. Similarly, programs assessing individuals' areas of weakness, which subsequently tailored a program to address any problems, rated well.

#### **4.16.2.3 Ratings of Home Hazard Assessment and Modification Programs**

All of the home hazard assessment and modification programs included in the review achieved a three star rating or above. The distinction between programs of this type obtaining a three star rating compared to a five star rating related to the comprehensiveness of the assessment tool or checklist used to identify home hazards and their relevance to falls prevention and the training level of the assessor. Programs incorporating a home hazard assessment by clinicians, such as occupational therapists,

rated more highly than programs involving an assessment by staff with minimal or no training. The availability of those involved in the assessment process to instigate home modifications also contributed to programs rating well for this intervention type.

#### **4.16.2.4 Ratings of the Individualised Risk Factor Assessment Programs**

All of the individualised risk factor assessment and management programs contained in the review obtained two stars or more, with the majority gaining a three star rating. Factors influencing the rating of programs of this type included the number and diversity of clinicians involved in the assessment process and access to other health professionals as required; the comprehensiveness of the assessment tools used to determine the presence of risk factors for falling; the involvement of those undertaking the assessment in the implementation of a management plan; the existence of protocols outlining the program; and the role of each clinician.

#### **4.16.2.5 Ratings of the Public Safety Programs**

Public safety programs that established and formalised processes to enable the appropriate authorities to respond to reported public hazards rated well in this section of the evaluation guidelines. This was particularly evident where a program included the development of a hazard reporting form to facilitate and encourage the reporting of hazards and also included an audit of public spaces with the participation of a range of stakeholders.

#### **4.16.3 Program Sustainability and Institutionalisation**

Fifty-eight of the falls prevention programs within the review obtained a five star rating in the program sustainability and institutionalisation section of the evaluation guidelines. The ongoing availability of program resources, as well as the capacity for ongoing evaluation and necessary program modifications, contributed to a good rating for this section. The fact that a large number of programs obtained five stars may indicate that this section of the evaluation guidelines lacked sensitivity.

#### **4.16.4 Program Evaluation and Effectiveness**

The majority of falls prevention programs contained in the review obtained a two or three star rating in the program evaluation and effectiveness section of the evaluation guidelines. The only program obtaining a five star rating in this section incorporated a randomised controlled trial into their evaluation design. A large number of programs, many of them implemented in 1998, could not be rated in this section because the evaluation process was incomplete.

When comparing the rating of programs in the evaluation and effectiveness section of the evaluation guidelines to the intervention type adopted, no association between this rating and the intervention type is evident. Approximately 15% of home hazard assessment and modification programs, public safety programs, structured exercise programs and individualised risk factor assessment and management programs obtained a four star rating or above in this section of the guidelines.

### **4.17 Summary and Discussion**

The largest number of falls prevention programs was introduced in 1998. The impact of the majority of these programs has not yet been established. Most programs were motivated by a perceived need identified by a health professional interacting with older

people. Those organisations involved in implementing programs have generally been aware of a number of other programs and have regularly incorporated aspects, particularly resources, from previously implemented falls prevention programs. Older people have been the target group for the majority of programs, often in conjunction with health professionals in direct contact with older people.

The language and cultural backgrounds of the target audience has consistently been considered in the development stages of a program. However, this has not usually led to the provision of resources in languages other than English. This is mainly because organisations involved in the delivery of programs reported that there was limited demand or a lack of resources to accommodate this need.

In general, the aims of the programs contained in the review were clearly stated. However, most organisations limited their measurement of achievements to process and impact evaluation. The accessibility of programs to the target population has been facilitated through participation in the majority of programs incurring minimal or no cost to participants and through the provision of some transport in approximately one-third of programs.

Multidisciplinary input was incorporated into the design of most programs in the review. This did not appear to be associated with greater program sustainability. However, a number of programs were only recently implemented. Further analysis will, therefore, be required for these programs.

The ability of programs to determine the long term outcomes of their intervention on falls rates has been limited, with only a minority incorporating ongoing follow-up. Funding limitations affected the capacity of organisations to undertake follow-up.

With regard to the risk factors addressed by the various programs, organisations appeared to be well informed of the multi-factorial nature of falls. This is evident in the multi-strategic approach adopted by the majority of organisations. Less than 50% of programs were reported to be sustainable. Permanent staffing was more frequently associated with sustainability than permanent funding. Impact evaluation through the adoption of pre- and post-evaluation was the most frequently reported type of evaluation. Few programs in the review reported outcome measures, that is, falls or falls injuries.

The critical appraisal process revealed the quality and diversity of falls prevention programs to date. Issues related to the design and development of programs appeared to have been well considered, with the majority of programs obtaining a three or four star rating. Similarly, the overall rating of the content of the programs, with the majority gaining a three star rating, indicated that organisations were aware of the multi-factorial nature of falls and had implemented interventions which reflected this understanding.

A large number of falls prevention programs obtained a five star rating in the sustainability and institutionalisation section of the evaluation guidelines. Although this section of the guidelines may have lacked sensitivity, it suggested that processes were usually in place to sustain programs. Few programs achieved a four out of five star rating in the evaluation and effectiveness section of the guidelines, however, a number of recently implemented programs were yet to undertake or report the outcomes of their evaluation.

The evaluation guidelines (available in the full report) were a useful tool and enabled an overall evaluation of Australian falls prevention programs. The guidelines may assist those commencing a falls prevention program by highlighting important issues which should encourage good outcomes.

There has been a large amount of falls prevention work conducted in the general community in Australia. However, few conclusions can be drawn regarding the impact of these interventions on falls rates among older people. While this uncertainty remains, greater resources need to be directed into undertaking planned evaluations that will provide a basis for future falls prevention initiatives.

## **5. Recommendations for Falls Prevention Strategies**

### **5.1 Framework**

The evaluation guidelines used to appraise the falls prevention programs in this review were based on evidence-based principles drawn from the available research literature, health promotion guidelines and expert opinion of the reference group. These guidelines may be used to inform the development of a falls prevention program proposal. Four key areas were considered critical:

- Program design and development
- Program content
- Program evaluation and outcomes
- Program sustainability.

Ideally, a falls prevention program should meet most, if not all, of the criteria in the evaluation guidelines in each of these areas. The challenge lies in developing a program which achieves this goal. This review of 131 current or recent falls prevention programs in Australia has identified that no program met these criteria across the four areas.

As indicated in the program content section of the guidelines, there are five broad program types which could be incorporated into a falls prevention program. These are:

- Education
- Structured exercise
- Home hazard review
- Public safety
- Individualised risk factor assessment and management programs.

A program which has a solid evidence base and could, therefore, be considered best practice, could be developed in any one of these areas based on the evaluation guidelines.

Two examples of generic, evidence-based interventions are described below:

- An individualised risk factor assessment and management involving GPs screening older clients
- A structured exercise program to be implemented in the general community.

### **5.2 Project Overview: Individualised Assessment**

In recognition of the multi-factorial nature of falls, this intervention involves screening older people to identify falls risk and implementing a targeted management plan. GPs appear ideally placed to undertake this initial screening given that approximately 80% of Australians visit their GP each year (Commonwealth Department of Health and Family Services, 1996), with rates of consultation likely to be higher for older people with existing medical conditions. Therefore, a program of this type could be implemented as a population-based approach to falls prevention.

A description of how an evidence-based intervention involving GPs screening their clients for falls risk should be developed and implemented follows. Reference to barriers encountered by organisations involved in the implementation of similar programs will

also be made. It is envisaged that such an intervention would be trialled and evaluated in a small number of medical practices and extended more broadly on completion of the trial.

### **5.2.1 Individualised Assessment Program: Design and Development**

A steering committee would be established consisting of GPs participating in the intervention and their staff, along with representatives from the Division of General Practice and the Migrant Resource Centre (MRC) and health professionals likely to receive referrals as a result of the intervention. Lack of time has been cited in previous programs as a barrier to GP participation and therefore the involvement of GPs in the formative stages of the intervention will help to ascertain what is feasible.

Focus groups involving older people recruited from a medical practice not participating in the intervention would be held to ascertain the barriers to older people acting on the recommendations of their doctor and strategies to overcome these barriers.

The intervention would target people over the age of 65 presenting to their GP. This would include the majority of those presenting with a fall, those at risk of falling and/or those with a history of falling.

Upon selection of the participating medical practices, the language and cultural backgrounds of the target group would be assessed and information pertinent to the program would be developed into appropriate community languages. Issues regarding access and use of interpreters would be considered. The involvement of the MRC would also enable an understanding of cultural issues requiring consideration.

In relation to the selection of medical practices, a needs analysis would be conducted to ascertain those practices with a high percentage of older clients. This acknowledges that the profile of a GP's clients, in relation to the number of clients who are older people, is likely to influence the uptake of the program by GPs.

Using the Falls Intervention Database, a search of similar programs would be undertaken. Contact would then be made with appropriate organisations and resources obtained, where possible. This information would be used to inform the development of the program generally and any resources required for the implementation of the intervention.

Community transport would be offered to participants, if required, although it is anticipated that most participants would have their own means of transport. Attempts would be made to keep other costs to a minimum. The program would aim to have no direct charge to the older person for the initial screening and minimal cost and/or cost subsidisation associated with acting on recommendations. Strategies would need to be developed to ensure that sufficient reimbursement for the GP's time was available through other means, such as appropriate classification and billing under the Medicare schedule.

The intervention would be promoted through the Division of General Practice newsletter, letters to participating GPs, local newspapers, local media such as radio, posters and pamphlets on display at medical surgeries of intervention group GPs and presentations to local allied health professionals and service providers.

Follow-up of participants would initially be scheduled at three, six and 12 months for those identified as being at risk of falls and then on an annual basis. This would allow for review of recommendations and re-assessment of clients. The latter reviews would facilitate evaluation at an individual and medical practice level. Staff at the practice

would be responsible for setting up follow-up appointments. The project budget would need to accommodate funding for this time.

### 5.2.2 Individualised Assessment Program: Content

To be practical in the GP setting, a falls risk screening tool needs to meet several criteria. These include that it must be:

- Quick to perform
- Require minimal or no specialised equipment
- Require minimal or no training.

A small number of GP oriented community-based falls risk screening tools were identified in the review of falls prevention programs in Australia (eight programs). However, none have been subjected to critical analysis with respect to their ability to accurately classify those at risk of falls. This would enable those identified to be targeted for more detailed examination and/or intervention. There are four important issues to be considered in the evaluation of the capacity of a screening tool to accurately classify individuals. They are:

- **Sensitivity**, that is, how well a diagnostic (in this case, a screening) test detects a target disorder (falls) when it is present. In other words, the number of people who were truly fallers as a proportion of those who were classified as fallers by the screening tool.
- **Specificity**, that is, how often a diagnostic (screening) test is negative when the target disorder is not present (that is, a non-faller). In other words, the number of people who were truly non-fallers, as a proportion of those who were classified as non-fallers by the screening tool.
- **Positive predictive value**, that is, the number of people correctly identified as fallers as a proportion of all those predicted to be fallers.
- **Negative predictive value**, that is, the number of people correctly identified as non-fallers, as a proportion of all those predicted to be non-fallers (Sackett, 1992).

As a general guide, sensitivity, specificity and positive and negative predictive values should all be approximately 0.8 or above to indicate that the screening tool achieves a good level of accuracy, with minimal misclassification.

The study by Cwikel and colleagues identified a relative risk of falling in the next 12 months of 6.2 for those rated at high risk of falling, compared to those rated as low risk of falling. A sensitivity of 0.5 and a specificity of 0.83 in the classification of fallers were also identified (Cwikel et al., 1998). Positive and negative predictive values were able to be calculated from the data in the study to be 0.61 and 0.76 respectively. While not meeting the gold standard of 0.8 in each of the four areas, these prediction accuracies are relatively good given the simplicity of the screening tool. It may be possible to improve these values further with some small refinements to the Cwikel screening tool. The initial screening undertaken by the GP as part of the best practice intervention would utilise the Cwikel screening tool incorporating a slight modification.

Instead of performing the five metre walk, it is proposed to include the 'Timed Up and Go' test (Podsiadlo & Richardson, 1991). This test can be performed in a smaller area (such as most GPs' offices), compared to the five metre walk in the Cwikel protocol. The Timed Up and Go test involves using a stop watch to time a person standing up from a chair, walking three metres, turning, then returning to the chair and sitting down. Potentially, this test may be more discriminative than a straight walk. The gait style

section of the Cwikel screening tool would be maintained, but performance would be rated during the Timed Up and Go test.

### **5.2.3 Individualised Assessment Program: Implementation**

Upon completion of the needs analysis, medical practices rather than specific GPs would be selected to participate and randomly allocated to the control or intervention group. The clients of the GPs in the control group would be screened, but the screening would not be associated with any structured intervention protocol.

The clients of the GPs in the intervention group would be screened with actions being recommended and facilitated through GPs implementing changes and staff assisting in the referral process or providing pertinent published information to clients. For each point included in the screening tool, an action would be listed. This may include distributing a brochure detailing local exercise programs or a list of hardware stores stocking safety equipment. Impaired performance on the Timed Up and Go test would indicate referral to a physiotherapist required or participation in an exercise program recommended.

In relation to the recruitment of older people, those aged 65 years or over attending participating medical practices over a six-month period would be asked by reception staff whether they would be willing to attend a subsequent appointment for a brief falls screen. Information about the project would be provided to all potential subjects.

### **5.2.4 Individualised Assessment Program: Evaluation and Outcomes**

Both the intervention and control groups would be followed-up at three, six and 12 months and re-screened. Incidence of falls and injurious falls would be monitored through a falls diary returned at the end of each month, with staff following-up those not returned or where falls are reported. In the intervention group, issues related to compliance with management recommendations would be investigated.

Re-assessment of participants on an annual basis would allow ongoing evaluation of the intervention and create an opportunity to review and modify the intervention in response to the outcome of the evaluation.

### **5.2.5 Individualised Assessment Program: Sustainability**

The screening process has been constrained to be brief and therefore able to be factored into a standard GP consultation time. This is a key factor in increasing the likelihood of uptake and sustainability in the longer term. An in-service training program would be established to ensure that new staff could be educated in the screening process and procedures. An original copy of the resources developed and used as part of the intervention, including the screening tool, pamphlets and posters, would be located at the medical practice for easy duplication as required.

Following evaluation of the pilot program, the program could be extended if the results indicate reduced falls and injuries and high compliance both among GPs as well as their older clients.

## **5.3 Project Overview: Structured Exercise Intervention**

An evidence-based intervention involving a structured exercise program focusing on balance and strength training is described. A number of studies reported in the literature have demonstrated improvements in intermediate outcomes such as improved balance

associated with participation in an exercise program. Other studies have also reported reductions in rates of falls where the exercise program has targeted balance retraining and also where the exercise intervention was implemented in conjunction with other intervention types, for example, home hazard assessment.

The structured exercise intervention would be implemented in a number of community health centres and fitness centres. The intervention would incorporate balance and strength training exercises with classes conducted by trained instructors, allied health staff and peer leaders who had undergone some initial training in relation to specific exercises to be incorporated.

### **5.3.1 Structured Exercise Program: Design and Development**

The structured exercise program would target people over the age of 65 with or without an existing balance problem. Recruitment into the program would be generated through media promotion (discussed below) and also through community health centre staff recommending appropriate clients.

A steering committee would be established consisting of community health centre staff, fitness instructors interested in participating in the program, and representatives from the MRC, local seniors organisations and the Division of General Practice. The participation of these stakeholders in the development of the program would be imperative to its successful implementation. More intensive consultation would occur with local MRCs to ensure the promotional materials adopted and format and type of exercises incorporated into the classes were culturally appropriate for the communities to be targeted by the program.

Focus groups of older people from a range of cultures would be held to explore their perceptions of physical activity, in particular barriers to participation in, and maintenance of, an exercise program. On completion of the focus groups, participants would be invited to become peer exercise leaders. Preferably a number of interested parties would be bi-lingual.

An important component in the developmental process is to investigate any other similar programs that had been implemented. A search of the Falls Intervention Database for similar programs would be undertaken and contact would then be made with appropriate organisations. Information would be sought on any barriers they encountered in implementing and maintaining their program and any useful resources they developed or used. These may include training resources for exercise leaders, handouts and other related materials.

The exercise classes would be located close to public transport or where older people currently meet, such as senior citizens centres. Community transport options would be explored and promoted to eligible participants. Participants would be asked to make a small donation at each class to cover the instructor's time.

The exercise classes would be promoted through community radio and newspapers, seniors newsletters and posters displayed at community health centres, local fitness centres, shopping centres, medical surgeries, neighbourhood houses, senior citizens centres and local citizens advice bureaus. Staff at the local community health centres and medical centres would be informed of the program to enable them to advise their clients. An information sheet describing the potential benefits of the program, issues of access and location of classes would be distributed to all people aged over 65 years presenting for an appointment, prior to seeing their medical or other practitioner. The information sheet would encourage discussion of the issue of exercise during the consultation.

### **5.3.2 Structured Exercise Program: Content**

A variety of classes would be offered to ensure participants could select or be referred into a class suitable for their needs. Each participant would be required to ask their GP to complete a medical clearance form prior to commencing an exercise program. The medical clearance certificate would also include details of individuals' existing medical conditions which would be provided to the instructor with the consent of the participant.

Participants would be assessed prior to their involvement in a class and at every four months of program participation. Participants would be provided with feedback about performance relative to previous assessments. Instructors would be trained to undertake the assessments which would include the Timed Up and Go test and the functional reach test. Based on the results of the tests, the assessor would then recommend participation in a high, medium or low intensity class.

### **5.3.3 Structured Exercise Program: Evaluation and Outcomes**

As mentioned above, participants would be re-assessed on a number of balance measures every four months, for up to 12 months, after they were originally assessed. Falls and any subsequent injuries would be recorded every three months along with participation levels. The latter would enable a comparison between level of attendance and changes in balance assessments. Other qualitative data would also be gathered in relation to what motivated participants to become involved in an exercise program and what barriers, if any, they faced in getting started and maintaining their commitment to the program.

### **5.3.4 Structured Exercise Program: Sustainability**

A train the trainer model would be adopted to ensure the intervention was sustainable beyond the initial introduction of the program. Interested community health centre staff and fitness instructors would be trained to undertake and record the initial assessments and to conduct the classes of varying intensity. They, in turn, would train other staff and peer exercise leaders.

## **5.4 Summary**

The proposals outlined provide an overview of projects which have been based on principles drawn from the available research literature, health promotion guidelines and expert opinion of the reference group. They highlight how the evaluation guidelines used in the review can be used in planning a new program. The selection of the GP screening for falls risk as one of the interventions acknowledges the multi-factorial nature of falls, that most older people have regular contact with their GP and that a range of management options is most likely to be successful in reducing falls rates. The second intervention described acknowledges the promising results to emerge in relation to exercise programs targeting older persons and falls reduction.

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