TOPIC 9

Health Quality & Safety Commission New Zealand
Kupu Taurangi Hauora o Aotearoa

Improving strength and balance to prevent falls

How you can use **Topic 9**

Use Topic 9 as:

- an information resource that explains the evidence and rationale for older people doing strength and balance exercises to prevent falls
- a 60-minute professional development exercise for (see 60 minutes of professional development in this resource).

LIVE STRONGER FOR LONGER
PREVENT FALLS & FRACTURES

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Key messages in **Topic 9**

- Strength and balance exercise programmes can reduce falls, and even the most serious injuries from falls (such as fractures and death), in older people who live in the community. Exercise is not as consistently effective in aged residential care, but may be useful as part of integrated interventions.
- Effective strength and balance exercise programmes enable older people at risk of falls to remain independent and well at home. This may also reduce the number of older people admitted to hospital.
- Older people assessed as likely to benefit from strength and balance training should have access to effective strength and balance community group programmes designed to reduce falls. If the older person is too frail and requires a clinician-delivered approach, they should be offered an in-home programme
- Criteria endorsed by the Accident Compensation Corporation (ACC) recommend the older person should do the exercises at least two hours per week to be effective. Evidence suggests that three hours a week can be even more effective. Exercises that challenge balance are needed to prevent falls.
- The older person should be encouraged to complete the programme and then continue exercising to achieve maximum and lasting benefits. Exercises that challenge balance are needed to prevent falls.
- Many older people reject the idea they're at risk of falling. So we may need to promote the positive benefits of exercise programmes on their health, wellbeing and independence. ◆

What **Topic 9** covers

Topic 9 explains how exercise helps to prevent falls in older people. As health professionals, we want to offer appropriate, evidence-informed advice and referrals.

Certain types of exercise programme are effective in reducing the number of older people who have a fall and the number of falls that older people have (Sherrington et al 2019).

In particular, older people with balance problems, muscle weakness, unsteady gait or mobility limitations are much more likely to fall. Exercises designed to improve their balance and increase their strength help reduce the risk that older people will fall (Sherrington et al 2019; de Souto Barreto et al 2018).

International guidelines from the National Institute for Health and Care Excellence, the American Physical Therapy Association, the American Geriatrics Society and British Geriatrics Society, and the Centers for Disease Control and Prevention (CDC) all recommend strength and balance exercises for older people to prevent falls (Avin et al 2015; Kenny et al 2011; National Institute for Health and Care Excellence 2013; Stevens and Burns 2015). Cost-effectiveness analyses have shown exercise programmes that prevent falls are good value for the health dollar (Carande-Kulis et al 2015; Robertson et al 2001; Deverall et al 2017; Winser et al 2020).

The ACC, in collaboration with the Health Quality & Safety Commission (the Commission), the Ministry of Health, district health boards, clinicians and carers set up national programmes in 2016 to prevent and treat falls in older people.

Two technical advisory groups reviewed the evidence and recommended best practice guidelines for in-home and community group strength and balance programmes. This built on work already carried out by the Commission on preventing harm from falls.

The technical advisory groups applied the evidence base and developed independent reports on in-home and community group strength and balance criteria with recommendations to ACC (Technical Advisory Group for Community Group Strength and Balance Programmes 2016; Technical Advisory Group for In-home Strength and Balance Programmes 2016).

Those recommendations formed the core of the cross-agency, whole-of-system approach to creating national access to safe and effective community and in-home strength and balance programmes. ◆

The right type of exercise improves, balance and strength

Balance retraining exercises are key

Although many different risk factors contribute to falls and subsequent injuries, muscle weakness, poor balance and unsteady gait underlie most falls (Campbell et al 1989). Older people with muscle weakness, balance or gait deficits, or limited mobility are 3–5 times more likely to fall in any one year than their peers without functional impairments (Rubenstein 2006).

Exercise is physical activity that is planned, structured, repetitive and aimed at improving or maintaining one or more components of physical fitness. Exercises that prevent falls need to challenge balance (Sherrington et al 2016; de Souto Barreto et al 2018). Strength and balance training exercises increase muscle strength, core balance and gait, even in frail older adults who are relatively weak (Panel on Prevention of Falls in Older Persons and Geriatrics Society 2011). Strength and balance exercises can also improve mental skills, and neurological control in older people (Sherrington and Henschke 2013).

Even so, not all types (or combination of types) of exercise reduce falls. The technical advisory groups' recommendations for effective exercise programmes are explained below. ◆

Which older person you should refer to which strength and balance programme

When deciding whether to refer an older person to a strength and balance exercise programme, consider the person's age, prior history of falls and cognitive impairment.

Ask any person aged 65 and above who lives in the community the following questions. The questions are key to determining the benefit of a strength and balance programme.

1. Have you slipped, tripped or fallen in the past year?
2. Do you have to use your hands to get out of a chair?
3. Have you stopped some activities because you're afraid you might lose your balance? Do you worry about falling?

Most older adults will benefit from exercise training. But if the answer to any of these questions is 'yes', they will be even more likely to benefit from a strength and balance programme designed to reduce falls. For the very frail requiring an in-home programme, they are more likely to have had assessment and management of their frailty-related health already and a referral for strength and balance should not therefore generate duplicating assessment and delayed interventions. For example, older people who receive services in-home will have already had a home-interRAI assessment.

WHICH OLDER PERSON YOU SHOULD REFER TO WHICH STRENGTH AND BALANCE PROGRAMME *Continued*

Community strength and balance group programmes

In most cases community strength and balance group programmes are appropriate for individuals aged 65 and older. Classes may also benefit others at increased risk of falling, such as adults aged 50–64 with clinically significant chronic conditions that affect their mobility, and adult Māori or Pacific peoples.

You could refer people who are living independently with mild cognitive impairment to a community strength and balance group programme. Consider the size of the class and the ability of the person to take part in a group activity, follow instructions and perform exercises at home (Technical Advisory Group for Community Group Strength and Balance Programmes 2016).

In-home strength and balance programmes

In-home strength and balance programmes, such as the Otago Exercise Programme (OEP), which involves one-on-one supervision, are appropriate for those who are over 75 (Māori and Pacific peoples over 65) and:

- have poor strength
- have poor balance
- are too frail to attend group-based exercise programmes in the community that focus on preventing falls
- have no access to a suitable community strength and balance group programme locally.

Referring an older person to an exercise programme doesn't mean you don't need to look at all their risk factors. Some risk factors may exclude the person or need to be addressed before the person starts exercises. Risk factors include, but aren't limited, to:

- cognitive impairment
- medication that may cause the older person to fall
- problems with vision
- foot problems
- hazards in the home
- other factors that may increase the risk of the older person falling (Technical Advisory Group for In-home Strength and Balance Programmes 2016).

It is important to note that many of the same guideline-based fall and fracture prevention interventions work for older people with cognitive impairment and are as applicable to this group of people who have even higher risk of falling (Lewis et al 2017). It may be that the older person's exercise programme simply needs to be more closely supervised. ◆

How to encourage older people to take part in exercise programmes

Emphasise that exercise programmes have many positive benefits

To encourage older people to take up, and stick with, an exercise programme, we need to design and offer programmes that will suit them. This means first considering what prevents them from taking part, and then removing those barriers. For example, the older person may:

- feel they are powerless to make a difference to their health and wellbeing
- fear they will fall
- deny their risk of falling
- underestimate their risk of falling
- think they won't finish the programme even before the start
- think that falling is a normal part of the ageing process
- be not used to exercising or have never exercised
- have poor health, or not expect any improvement
- have little physical, psychological, cognitive or social ability to do normal activities
- feel that programmes targeted at older people stigmatise them (Bunn et al 2008).

Health professionals should attempt to identify the motivators and deterrents of each individual during exercise interventions. Behavioural change strategies can then be tried, alongside educational elements in the programmes, so that participants can incorporate exercise into everyday life (Finnegan et al 2019a).

A common misconception is that exercising can be harmful. So it's worth emphasising to the older person that the benefits of exercise outweigh the risks of being inactive (Burton et al 2016).

Also, many older people don't think they're at risk of falling. So we should emphasise the **many positive benefits the older person will gain** by enrolling in an exercise programme. One key benefit is the person being able to keep their independence (Yardley et al 2006). Other benefits cited by older people themselves are interpersonal skills and the opportunity for social interaction, which arise through a group exercise programme (McPhate et al 2016).

A personal invitation from a health professional can increase the likelihood that an older person will take part in a strength and balance programme (Yardley et al 2006). Coupled with community follow-up, a Green Prescription for an exercise programme was successful at increasing activity in older age groups (Kerse et al 2005).

Exercise may be effective for those with cognitive impairment (but you will need to closely supervise the person) (Booth et al 2016; Burton et al 2015; Lewis et al 2017). Factors influencing adherence to falls prevention exercises in those with cognitive impairment include: routine, practical and emotional support, memory support, purpose, past experiences of sport and exercise, and belief in and experience of benefits. Health professionals should understand these individual cognitive, psychological, and practical factors for interventions to be successful (Hancox et al 2019).

If we offer the older person various types of exercise and the choice of a group or individual programme, they're more likely to take part (Yardley et al 2006). All exercise programmes should be culturally appropriate (for example, we should recognise that mixed-gender exercising may prevent an older person from taking part) (Jang et al 2015). ◆

Features of effective exercise programmes

Falls prevention exercise programmes reduce falls-related fractures and injuries

Successful exercise programmes for preventing falls provide multiple activities. These activities include a moderate-to-high challenge to balance, and training and resistance exercises to strengthen the muscles of lower limbs (legs) (de Souto Barreto et al 2018; Ng et al 2019; Sherrington et al 2018). Two hours a week for at least 10 weeks appears to be the minimum effective 'dose' of strength and balance training (Technical Advisory Group for Community Group Strength and Balance Programmes 2016). For best results, the older person should continue to do the exercises three or more hours a week and continue beyond the end of the formal exercise programme (Sherrington et al 2016; Finnegan et al 2019).

Time spent exercising can be a mix of group exercise classes with home-based exercises undertaken in between. Strength and balance exercise can be incorporated into daily activities. Incorporating exercise within functional activities can be a key part of the delivery of in-home exercise. For example, health care workers can get the older person to sit–stand five times before settling them in a chair (Clemson et al 2012).

The in-home Otago Exercise Programme has a significant evidence base behind it (Robertson et al 2002; Robertson et al 2001). Other programmes, such as step training (Okubo et al 2016) and the group Fitness and Mobility Exercise Programme (FaME) (Gawler et al 2016), also reduce the number of falls. Tai Chi exercise has also been demonstrated to prevent falls (Ng et al 2019).

The features of effective strength and balance programmes to prevent falls are summarised in the following two tables.

Criteria for ensuring strength and balance group programmes for use in the community are effective

The technical advisory group established an evidence-based set of criteria for assessing community-based group exercise programmes. The criteria focus on improving the strength and balance of older adults.

1. The purpose of the programme must be to improve balance and leg strength to reduce the risk of falling.
2. Programme must include baseline and ongoing assessment of participant's physical function, including 'timed up and go'.
3. Programme must include exercises that provide individually assessed appropriate challenge to balance, and progressive strengthening of lower limbs.
4. Balance exercises should be a minimum of one-third of the total exercises, and should be done standing with progression to reduced base of support.
5. Programmes should include at least one hour-long group exercise session and, using resources provided, completion of home-based exercises every week for a duration of 10 weeks.
6. Programme should have a strategy to support ongoing regular physical activity or participation.
7. Instructors should be specially trained and have appropriate supervision (but need not be clinically trained).
8. Participants may be enrolled in the programme through a health professional or through self or community referrals.
9. Any inclusion or exclusion criteria must still ensure the programme is available to people at increased risk of falling.

FEATURES OF EFFECTIVE EXERCISE PROGRAMMES *Continued*

Criteria for ensuring strength and balance programmes for use in the home are effective

The technical advisory group established an evidence-based set of criteria for assessing programmes for use in the home with one-on-one supervision. The criteria focus on improving the strength and balance of frail older adults.

1. The exercise programme must be specifically designed to prevent falls, and consist of progressive leg muscle strengthening and standing balance training exercises.
2. A person referred to the exercise programme must have identified strength and balance deficits and it is clinically inappropriate to attend a community class-based programme.
3. The exercise programme must be individually prescribed and supervised by an appropriately qualified registered health professional (eg, for the OEP a physiotherapist or physiotherapist mentored nurse) who actively monitors the exercise programme.
4. Exercises should have clear instructions and illustrations with advice to perform them at least three times a week.
5. Individual, conventional measures of strength and balance should be monitored at intervals and the exercise programme progressed to maintain improvement.
6. The exercise programme should be an integral part of a coordinated falls and fragility fracture prevention approach adopted across local health systems.

Ideally, the older person should continue the exercise programme, so they don't lose the benefits gained from exercising. An older person receiving in-home exercise may improve so they can join a community class.

If you think the older person can walk safely, then include walking in their exercise programme. The exercise must be appropriate for them. For example, don't include faster walking in a person's programme if they're likely to fall or if it might exacerbate a health-related condition (Sherrington et al 2016). Exercising by only walking doesn't reduce the number of falls, but it does benefit the cardiovascular and overall health of the older person. ◆

How exercise helps to reduce falls – the evidence base

Systematic reviews and meta-analyses have assessed exercise programmes designed to prevent older adults from falling. Many studies examined falls alone, however evidence from systematic review shows that exercise programmes can prevent injury as well as falls (El-Khoury et al 2013).

Group programmes

- A 2016 systematic review and meta-analysis showed that group exercise programmes in the community that incorporated a range of strength and balance activities helped to reduce falls by 21–39 percent (88 trials, 19,478 participants) (Sherrington et al 2016). The group programmes (eg, FaME programme) are effective for older people in all groups at risk of falling (Gawler et al 2016).
- A 2012 Cochrane review of falls prevention interventions in older people also found that group-based exercises and in-home exercise programmes are effective in preventing falls (Gillespie et al 2012).

HOW EXERCISE HELPS TO REDUCE FALLS - THE EVIDENCE BASE *Continued*

Home-based programmes

- Exercise programmes at home that incorporated specific strength and balance activities helped to reduce falls by 32 percent (seven trials, 951 participants) (Gillespie et al 2012). Three of these trials tested the OEP in Dunedin and Auckland (Gillespie et al 2012).
- The home-based OEP reduced falls-related injuries by 35 percent (four trials, 1016 participants) (Robertson et al 2002).
- The OEP reduced the risk of death in the study period by 55 percent (seven trials, 1503 participants) (Thomas et al 2010).
- The OEP was more effective in participants aged 80 years and above. Injurious falls were reduced by 46 percent more in this age group than in those aged 65–79 (Robertson et al 2002).

Exercise helps to reduce people's fear of falling (Kumar et al 2016) and mitigates the impact of sarcopenia (muscle loss) (de Labra et al 2015).

In addition, meta-analyses suggest a relatively small, but possibly important, effect of exercise on bone density in post-menopausal women. (Howe et al 2011) Osteoporosis New Zealand recommends regular weight-bearing exercise to help maintain bone density.

A 2019 systematic review found that in long-term care, strength and balance exercise as a single intervention, reduced the number of fallers and recurrent fallers by 36 percent and 41 percent, respectively (Gulka et al 2019). However, we also know that complex interventions in ARC may be effective only when delivered with additional staffing, expertise or resources across multiple levels of the organisation (Francis-Coad 2018). This may partly explain previous uncertainty in the literature around the effectiveness of exercise in ARC.

Exercising can carry risks. Evidence shows that exercise programmes to prevent falls are generally safe, but participants in one trial, who used heavy ankle-cuff weights, experienced back or knee pain directly attributable to the resistance exercises (Latham et al 2003). As a general rule, exercises should start light, then gradually become harder and more intense (Campbell and Robertson 2010). A challenge to balance and muscle strength and progression of difficulty are essential for optimal benefit. We must take care with individuals recently discharged from hospital because evidence suggests that exercise may increase falls in this group (Naseri et al 2018). It is probably appropriate for those recently discharged from hospital to have more supervision initially and to begin with a lower dose of exercise.

One indication of the critical importance of widespread uptake of strength and balance programmes comes from a modelling study (Benzinger et al 2016). A model of the future demographic transitions in Bavaria showed that to limit the increase in number of fractures between 2014 and 2025 to only 10 percent, fall-prevention exercise participation rates need to be 25 percent, whereas to hold the 2025 rates flat at 2014 rates will require 43 percent participation in fall-prevention exercises. Large-scale intervention is needed. ◆

60 MINUTES OF PROFESSIONAL DEVELOPMENT

This learning activity equals 60 minutes of your professional development.

You can add it to the personal professional record you keep to check off your competence framework requirements.

To complete this learning activity, first read the whole topic and the three required readings, then assess your learning with the 10 self-test questions.

Learning objectives

Reading and reflecting on Topic 9 and the materials in this teaching and learning package will enable you to:

- outline best practice recommendations for older people to exercise so they don't fall
- explain why balance retraining and muscle strengthening are important in helping older people not to fall
- base your advice and referrals for strength and balance exercises on current evidence
- explore positive approaches to promoting strength and balance exercises with patients/residents/clients and their families/whānau.

Teaching and learning package

Gather up the resources you'll need. Use the hyperlinks in this topic, or download or print the reference material.

Required reading

These three readings will help you form evidence-informed perspectives on how exercise can prevent older people from falling.

1. This 2016 review investigated the characteristics of effective falls prevention exercise programmes and makes best-practice recommendations.
2. Don't mention the f-word! Advice on communicating falls prevention messages to older people is based on a study encouraging positive attitudes to help prevent falls in later life.
3. Ministry of Health factsheet on physical activity for older people.

+30 MINUTES RECOMMENDED VIEWING

These three audiovisuals of exercise programmes to prevent falls are part of a holistic approach to preventing falls. Viewing them will help you relate evidence and best practice to real-life initiatives.

1. Staying on your feet in the community (13 minutes 19 seconds) describes a group-based exercise programme led by trained peers.
2. Staying safe on your feet at home (12 minutes 26 seconds) describes a coordinated programme in Canterbury for preventing falls. It includes a strength and balance exercise programme for use in the home exercise programme.
3. Preventing falls in a residential care facility for the aged (7 minutes 52 seconds) looks at how one care facility is working with residents and their families/whānau.

RECOMMENDED RESOURCES AND WEBSITES

Resources for consumers

The Live Stronger for Longer programme has a number of resources for consumers that can be downloaded, ordered or shared online. These are available at: www.livestronger.org.nz.

Ministry of Health factsheet on physical activity for older people.

The CDC website lists positive benefits of physical activity.

International Osteoporosis Foundation exercise recommendations.

Resources for health care providers

Audiovisual: Staying safe on your feet at home (12 minutes 26 seconds) describes a coordinated falls prevention programme in Christchurch. This wider programme includes an exercise programme for older people to do in their home.

Falling costs: the case for investment investigates whether exercise programmes to prevent falls in older people in New Zealand offer value for money.

Ministry of Health Guidelines on physical activity for older people.

For information on Tai Chi for older people, see Tai Chi for falls prevention and Tai Chi: Moving for Better Balance.

10 QUESTIONS

TOPIC 9 Professional development: questions to test your knowledge

PROFESSIONAL DEVELOPMENT ACTIVITY

ANSWER these questions to check you have retained the knowledge reviewed in this topic and readings

ANSWER

1 Researchers say exercise programmes of more than 3 hours a week and high-challenge balance training can prevent falls (see **Table 4** of the required reading 'Exercise to prevent falls in older adults'). Which of these four combinations has the greatest effect on falls?
Check the correct box:
☐ inclusion of high challenge balance training
☐ 3+ hours per week of intervention
☐ neither high challenge balance training or 3+ hours per week of intervention
☐ high challenge balance training and 3+ hours per week of intervention

2 This reading's first 'best practice' recommendation (Box 1) is that exercises must provide a moderate or high challenge to balance to be effective in preventing falls. What exercises **do not** achieve this aim?
☐ extending the base of support while standing
☐ moving the centre of gravity while standing
☐ reducing the need to use the arms for support while standing

3 Mr Brown is 72 years old. He says his legs are 'not as good as they were'. He is wondering what physical activity and exercise he should add to his weekly round of golf to 'future-proof' himself. How would you approach a conversation with Mr Brown?
☐ advise him to take it easy – golf once a week is enough physical activity and there is no benefit in adding specific exercises
☐ discuss the recommendations in this factsheet with him, and suggest participation in a Tai Chi or group exercise class

4 Mrs Jones is 79 years old and living independently. Recently, she lost her balance and fell while out with friends. She suffered bruising and is afraid of falling again. She is wondering if physical activity or exercises could help prevent another fall.
What would your evidence-informed suggestion be?
☐ stay at home and move about the house as little as possible to reduce the risk of falls
☐ regularly attend a falls prevention exercise class at the local community centre
☐ go for a very brisk walk for two hours every day for the next three weeks

5 The hospital discharged Mrs Smith after she fractured her wrist in a fall. Mrs Smith is 83, lives with her daughter, and is motivated 'not to be a burden'. The community physiotherapist has visited her to teach her a set of exercises she can do at home.
Which option is better for Mrs Smith to reduce the risk of further falls?
☐ around 30 minutes once each week for 2 months, then discontinue the exercises
☐ around 30 minutes a day on 3 days each week for 6 months, and continue the exercises

ASSESS the processes used for assessing strength and balance impairments in older people in your setting

ASSESS

6 What process do you use in your care setting to assess whether older patients/residents/clients are having problems with their balance, gait or lower-body strength? The process we use is...

What would you need to change (if anything) to put in place a methodical and consistent approach to assessing all older people for balance and lower-body strength? What we would need to change is...

7 Describe three specific things you already do (or could do) to help your patients/residents/clients participate in exercise programmes to prevent falls?
1.
2.
3.

Outline three learnings or insights and how you will APPLY them in your practice

APPLY

8 My first learning/insight is:

I will apply it in practice by:

9 My second learning/insight is:

I will apply it in practice by:

10 My third learning/insight is:

I will apply it in practice by:

LEARNER	NAME:	PROFESSION:	DESIGNATION:
DATE:		REGISTRATION ID:	WORKPLACE:

Validation that learner has completed this professional development activity		Signature:
NAME:	PROFESSION:	CONTACT:
DATE:	REGISTRATION ID:	WORKPLACE:

For answers to the above self-assessment questions click here.

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