

# The Otago Exercise Programme:

## An evidence-based approach to falls prevention for older adults living in the community

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#### Abstract

Falls in older people are identified as a key priority area in the New Zealand Health Strategy. Falls are expensive, both in the dollar cost to the health system and in reduced quality of life for the older person. Risk factors for falls are multifactorial and complex, however two of the factors, reduced strength and poor balance, have been shown to be amenable to change with the appropriate input. The Otago Exercise Programme (OEP) is a well-designed and tested falls prevention programme that targets strength and balance deficits

and can lead to a reduction in falls by about one-third. A primary barrier to implementation is the difficulty in creating collaboration across a number of health professionals, including nurses, physiotherapists and general practitioners. This paper aims to increase awareness of the OEP and provide an opportunity to link health professionals and improve the implementation of evidence-based practice for falls prevention.

#### Key words

Falls, balance, older adults

#### How big is the problem?

About one-third of older people will experience at least one fall in a 12 month period<sup>1,2</sup> and around half of these people will have repeated falls.<sup>3</sup> In New Zealand there was a fall related death rate of seven per 100 000 person years between 1993 and 1999 for adults aged 60–74 years, and in people aged 75 years and over this rate increased to 99 deaths per 100 000 person years.<sup>4</sup> Almost all hip fractures in older people occur as the result of a fall<sup>5</sup> and in Auckland about

six women and three men in every 1000 over the age of 60 years will fracture a hip in any given year.<sup>6</sup> There are important consequences of fracturing a hip, including high mortality within the first three months, deterioration in functional ability, and a loss of independence.<sup>5</sup> Falls frequently result in the individual restricting their physical activity with a resulting decline in ability to perform activities of daily living and a higher risk of placement in a residential care facility.<sup>7</sup> The evidence suggests that falls

in older adults are a major and costly public health problem and impacts on both quality of life and functional independence. With the current demographic trend<sup>8</sup> toward an increasing proportion of older people in the population, we are likely to see increasing prevalence of falls in the future. Recent public policy documents, The New Zealand Health Strategy (2000) and the Health of Older People Strategy (2002), have recognised the importance of preventing falls in older adults and a key priority identified in



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these documents is to reduce falls in this group using programmes that are based on evidence of acceptability, feasibility and effectiveness.

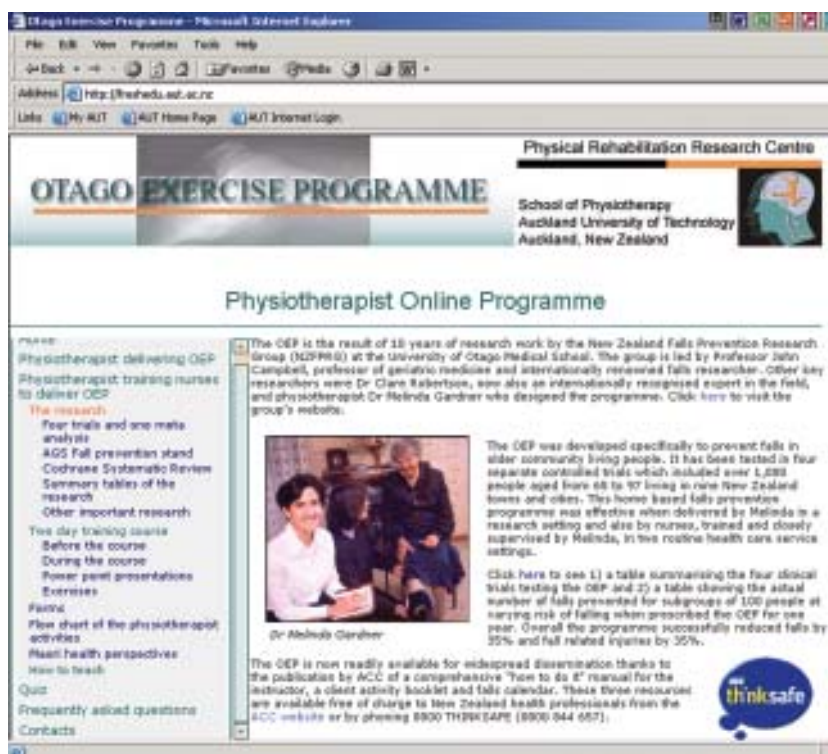
### What are the risk factors for falls?

Many risk factors for falls have been identified in the literature. It is outside the scope of this paper to discuss them all in detail but a brief overview will be given. The risk factors can be grouped into:

- Psychosocial and demographic
- Sensory and neuromuscular (including balance)
- Medical
- Medication
- Environmental.<sup>9</sup>

In the psychosocial and demographic category, factors such as increasing age, a history of falls and limitations in activities of daily living are strongly associated with an increased risk of falling.<sup>9,11</sup> There is some indication that women may be at a higher risk of falling; Campbell et al. reported a higher incidence of falls in women over the age of 70 years (40%) compared to men over the age of 70 years (28%).<sup>2</sup> As falls are considered to be indicators of frailty and functional dependency it is unsurprising that having previously fallen puts a person at a higher risk of falling again. The sensory and neuromuscular category of falls risk factors covers a multitude of issues. With normal ageing there is deterioration in many of the sensory and motor systems, including vision, vestibular function, peripheral sensation, muscle strength, reaction time and coordination.<sup>10</sup> Complex integrations of these sensory inputs with motor outputs are necessary for balance and functional performance. There can be a dramatic loss of muscle strength in older adults, some of it may be associated with losses considered normal with

Figure 1. The introductory page of the online learning programme for physiotherapists



ageing, but some muscle strength losses are related to decreasing physical activity levels and can therefore be considered as secondary effects of reduced mobility. This loss of lower limb muscle strength is associated with increased risk of falling.<sup>2</sup> With the multiplicity of changes in the various sensory and motor systems with ageing and disuse there is also a resulting reduction in balance control, which results in a higher risk of falling.

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with between a two and sixfold increase in the risk of falling.<sup>9</sup> The risk of falling increases with the number of chronic diseases an older adult has.<sup>12</sup> Polypharmacy is often cited as

The third category of risk factor listed above is the existence of a disease or impairment, such as stroke, Parkinson's disease or impaired cognition.<sup>11</sup> Stroke, for example, has been associated

a risk factor for falling although the relationship between the number of drugs taken by an individual and the risk of falling is not clear-cut, and it appears that it's the number of chronic diseases and multiple pathologies that is a stronger indicator of the risk of falling than the absolute number of medications taken.<sup>12</sup> Certain groups of drugs, however, such as psychotropics are associated with a higher risk of falling.<sup>13,14</sup>

Currently there is limited evidence to suggest that environmental factors are primary risk factors for falls.<sup>9</sup> However Day et al. reported that home hazard management did add value when combined with an exercise programme but failed to reduce falls when used as a single intervention.<sup>15</sup> It is worth emphasising that most falls result from an interaction of a number of risk factors and the risk of falling increases with the number of risk factors present.<sup>1</sup> The model purported by Stalenhoef et al. reflects the multifactorial nature of

falls; it suggests that GPs could use a history of two or more falls, a mobility impairment, decreased grip strength and the presence of a depressive state as an indicator an individual who is at very high risk for repeated falling.<sup>16</sup>

### Exercise-based approaches

Interventions designed to reduce specific risk factors that are amenable to change can reduce the risk of falling. Strength and balance deficits are two such factors that can be improved with rehabilitation. There is now very good quality evidence that strength and balance based exercise programmes reduce falls in community-dwelling older adults.<sup>15,17,18</sup> However, as reported in a Cochrane review of interventions for preventing falls in elderly people, not all exercise programmes for falls prevention have demonstrated a statistically significant reduction in falls in older adults.<sup>19</sup>

### The Otago Exercise Programme

The New Zealand Falls Prevention Research Group designed and tested a community-based strength and balance retraining programme, combined with a walking programme, known as the Otago Exercise Programme (OEP). To date, this group has published results from four trials and one meta-analysis<sup>20,21,22,23,18</sup> presenting findings from the OEP research. The key outcome from this research is that participation in the OEP reduces falls and falls-related injuries by about a third in older community dwelling people. In the first trial of the OEP a physiotherapist delivered the programme, however in successive research the OEP was delivered by nurses trained and supervised by a physiotherapist. In terms of the number of falls prevented there was no difference in outcomes whether a physiotherapist or a nurse trained and supervised by a physiotherapist delivered the programme to the older adult. The largest effect was seen in people aged

80 years or over or in people with a history of a falling.

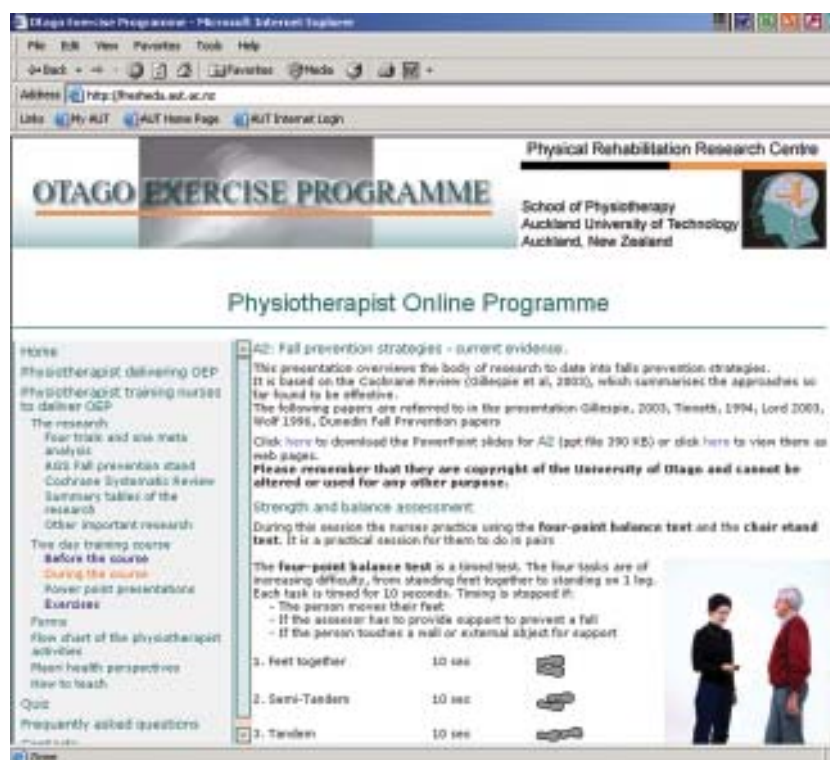
### Effective implementation

The OEP has a strong research basis, it is a well-described programme and a detailed description of this programme is freely available to health professionals through the ACC website ([www.acc.co.nz](http://www.acc.co.nz)). However, there is substantial evidence from many areas in health care delivery that practice does not automatically change based on research findings.<sup>24,25,26</sup> To encourage effective implementation of the OEP, the Ministry of Health funded AUT to coordinate the training of physiotherapists. The role of the physiotherapists is to train and supervise nurses or other registered health professional to deliver the OEP to older adults. Physiotherapists can also deliver the OEP directly to older adults, without training and supervising nurses or other registered health professionals. However, the aim of training and supervising nurses to deliver the OEP was an at-

tempt to maximise capacity. There are currently 29 nurses who deliver the OEP and are trained and supervised by five physiotherapists as part of the AUT project. Whilst AUT can fund physiotherapists to train nurses the funding of nurses is not available from AUT. Funding for the nurses has to date been from ACC or local PHOs or a combination of the two.

A web-based online programme for physiotherapists who are interested in training and supervising nurses to deliver the OEP to older adults living in the community has been designed and is freely available to physiotherapists. The online programme offers access to pertinent literature and guidelines on falls prevention strategies in general and the OEP in particular. It also offers information on teaching strategies and provides all the resources necessary for the physiotherapist to run a two-day education programme to train nurses to deliver the OEP to older adults (See Figures 1 and 2 for examples of the web page). Currently over 50 physi-

Figure 2. Strength and balance assessment page of the online programme for physiotherapists





otherapists from all over New Zealand have registered and accessed the OEP training website, yet only five who have trained and supervised nurses, with a further nine who are delivering the OEP directly to the older adult. An important factor is that delivery of the OEP requires the development of a collaborative approach between OEP trained physiotherapists, primary and secondary health care nurses and those who fund nurse positions. At this time the linking together of physiotherapist with nurses

is problematic. In the last six months we have coordinated and trained physiotherapists; the challenge is now to link the trained physiotherapists with more community-based nurses who are able to deliver the programme to older adults. Increasing the awareness of the OEP among individual GPs and GP practices may help to provide

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If you are interested in providing an OEP in your area and have between four and eight nurses who would like to be trained, please contact Denise Taylor ([denise.taylor@aut.ac.nz](mailto:denise.taylor@aut.ac.nz)). We can link you with an appropriately trained physiotherapist who can train and supervise your nurses. We meet the cost of the physiotherapist to train and supervise your nurses. The MOH has funded AUT until July 2005 to coordinate the training of physiotherapists to train and supervise nurses or other registered health professionals to deliver the OEP.

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