Age UK
Improving later life

Expert series

Falls Prevention Exercise – following the evidence

The evidence for falls prevention exercise and how it can be applied in practice.

Document purpose	To explain the research base for falls prevention exercise to give a better understanding of the programmes that have been shown to be effective in preventing falls.
Target audience	Clinical Commissioning Groups, Public Health professionals, commissioners of care services, health and care service providers, local Age UKs and other voluntary sector providers.
Title	**Falls Prevention Exercise – following the evidence**
Publication date	**June 2013**
Description	This document: • Describes the evidence base for falls prevention exercise • Outlines the benefits of evidence-based falls prevention exercise for older people and health and care services • Presents a range of services delivering to the evidence
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Why this guide?

Falls prevention exercise has been proven to be extremely effective in reducing falls. It plays an important role in the falls care pathway, both in terms of primary and secondary prevention, and can significantly contribute to reducing the financial burden on the NHS and social care by preventing fractures and avoidable hospital admissions. Audits of falls and bone health services have consistently shown, however, that provision of falls prevention exercise is patchy, at best, and often does not follow the guidelines for evidence-based practice.

This guide explains the research behind falls prevention exercise to give a better understanding of the kind of programmes that have been shown to be effective in preventing falls. It also provides examples of evidence-based programmes that are currently in practice and demonstrates how they contribute to an integrated falls care pathway.

Falls: the facts

- Falls and fractures in people aged 65 and over account for over 4 million hospital bed days each year in England alone.[1]
- The healthcare cost associated with fragility fractures is estimated at £2 billion a year.[2]
- Injurious falls, including 70,000 hip fractures annually, are the leading cause of accident-related mortality in older people.[3]
- After a fall, an older person has a 50 per cent probability of having their mobility seriously impaired and a 10 per cent probability of dying within a year.[4]
- Falls destroy confidence, increase isolation and reduce independence, with around 1 in 10 older people who fall becoming afraid to leave their homes in case they fall again.[5]
- A tailored exercise programme can reduce falls by as much as 54 per cent.

1 Royal College of Physicians. 2011. *Falling Standards, broken promises: report of the national audit of falls and bone health in older people 2010*
2 ibid
3 ibid
4 Help the Aged, 2008. *Towards Common Ground*
5 Help the Aged, 2008. *Spotlight Report 2008*

Background

There are many different reasons why people fall in later life. It can happen as a result of dizziness caused by different medications[6] or medical conditions, such as syncope or Parkinson's Disease. Falls can be caused by extrinsic factors such as poorly fitting footwear[7] and uneven paving, or by the physiological conditions associated with ageing, such as natural deterioration in eyesight and muscle strength, which can make it difficult to balance,[8] see and step over potential hazards. In many cases, it is not simply one, but a combination of these risk factors that leads to a fall.[9]

Good detective work is therefore essential when it comes to determining the causes of, and effective treatment for a fall. In addition to a multifactorial risk assessment, it is crucial that those at risk are offered a range of interventions, including medication reviews and home safety or hazard assessments.[10] The most effective component of a multifactorial intervention is therapeutic exercise,[11] as balance impairment and muscle weakness caused by ageing and disuse, are the most prevalent modifiable risk factors for falls.

Almost 20 years of research into the subject has led to a very good understanding of exactly what kind of exercise and how much is needed to be effective in preventing falls.[12] One Randomised Controlled Trial showed that a tailored group exercise programme delivered over a nine month period can reduce the risk of falling by as much as 54 per cent.[13] Another, based in New Zealand and using home based exercise over a year, showed a reduction of some 35 per cent.[14] Yet, despite this, and the huge potential these exercise programmes hold in helping to make dramatic improvements in quality of life and achieve significant cost savings, older people continue to have limited access to evidence-based falls prevention programmes. Where these programmes are available, the vast majority are altered or scaled down to an average duration of 12 weeks or less.[15] Yet we know that a 'dose' of at least 50 hours is necessary to reduce falls.[16]

6 NICE guidelines, CG161, 2013. Falls: The assessment and prevention of falls in older people
7 Spink et al, 2011. 'Effectiveness of a multifaceted podiatry intervention to prevent falls in community dwelling older people with disabling foot pain.' *British Medical Journal*
8 British Geriatrics Society and The College of Optometrists, 2010 *The Importance of Vision in Preventing Falls*
9 Visibility, 2005. *Deteriorating Vision, Falls and Older People: The links*
10 NICE guidelines, CG161, 2013. Falls: The assessment and prevention of falls in older people
11 Department of Health, 2009. Falls and fractures: effective interventions in health and social care.
12 Cochrane Review, 2012. Interventions for preventing falls in older people living in the community.
13 Skelton et al, 2005. Tailored group exercise (Falls Management Exercise — FaME) reduces falls in community-dwelling older frequent fallers (an RCT).
14 Campbell at al, 1997. 'Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women.' *British Medical Journal*
15 Royal College of Physicians. 2011. *National audit of falls and bone health in older people*
16 Sherrington et al. 2011 'Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations.' *New South Wales Public Health Bulletin*

There are a number of reasons for this. Firstly, there are common misconceptions about what constitutes the evidence base for falls prevention exercise – perhaps because of the sheer number of research trials that have been undertaken. Funding priorities can also be a barrier, particularly due to the duration of these programmes, which can appear expensive, even though the cost is low compared to the costs of fractures. However, much like prescribing half a dose of antibiotics (where the patient is unlikely to make a full recovery and need to return for further treatment), a half-course of falls prevention exercise will be ineffective and result in even greater costs to health and social care services and may even increase the risk of falls and fractures.[17]

In addition, many instructors delivering falls prevention exercise programmes are not appropriately trained,[18] and therefore inadvertently promote alternative exercises as falls prevention (such as chair-based classes). This can reinforce misconceptions about what works.

There are a number of evidence based exercise programmes, these are:

- Otago
- FaME (Falls Management Exercise)/Postural Stability Instructor (PSI)

There is a need to ensure a smooth transition on from FaME/Otago programmes to further exercise opportunities. This will enable older people who have fallen to continue the progression of training to ensure effective outcomes.

17 Royal College of Physicians. 2012. *Older people's experience of therapeutic exercise as part of a falls prevention service. Patient and public involvement*

18 ibid

3 What is the evidence for falls prevention exercise?

What is the evidence for falls prevention exercise?

The most important consideration when it comes to commissioning and delivering falls prevention exercise is that there is no 'one-size fits all' solution. Programmes must be tailored to the individual in order to be effective, which means the exercise must be pitched at the right level and enable participants to progress. It must also take medical conditions and falls history into account. So, whereas Tai Chi will be effective for those who have not yet fallen (or who have only mild deficits of strength or balance),[19] it is less effective for those who have fallen and are more frail.[20] There is the potential that this could put those who have already experienced a fall at greater risk of falling again, if their balance is not good enough to safely perform three dimensional unsupported movement, or that it is adapted to seated or fully supported movement which will not reduce the risk of future falls.

In summary, the evidence for effective falls prevention exercise states that programmes must be of the correct **type, duration** and **intensity.**

Type

The principle of falls prevention exercise is to counter the effects of muscle deterioration, particularly those that keep us upright and enable us to walk without swaying. Therefore, all falls prevention exercise must focus on strengthening leg and ankle muscles and challenging balance.[21] In essence, this means programmes must include resistance training and exercises done while standing. So, effective falls prevention cannot be achieved solely through chair-based programmes and seated gym machines.

When it comes to the type of exercise, it is also important to note that although programmes for both primary prevention (preventing first falls) and secondary prevention (preventing further falls) will be the same, (i.e. both focus on strength and balance), they will vary in the way they are delivered in order to meet the needs of the individual, especially where there is higher risk of falls. Programmes for secondary prevention, for example, will need to provide more support in the form of targeted interventions with controlled movements, and in some cases, operate on a one-to-one basis.[22]

19 Wolf et at. 1996. 'Reducing frailty and falls in older persons: an investigation of Tai Chi and computerized balance training. Atlanta FICSIT Group. Frailty and Injuries: Cooperative Studies of Intervention Techniques.' *Journal of the American Geriatrics society*

20 Wolf et al. 2003. 'Intense tai chi exercise training and fall occurrences in older, transitionally frail adults: a randomized, controlled trial.' *Journal of the American Geriatrics society*

21 Kenny et al. 2011. 'Summary of the updated American Geriatrics Society/British Geriatric Society Clinical Practice Guideline for preventing falls in older people' *Journal of the American Geriatrics Society*

22 NICE guidelines, CG161, 2013. Falls: The assessment and prevention of falls in older people

Frequency and duration

In order to build up muscle and maintain a level of strength and balance to effectively prevent falls, exercises must be performed regularly and frequently. The recommended frequency for effective falls prevention is at least twice – and preferably three times – a week.[23] Therefore, evidence-based programmes delivered through weekly classes should 'prescribe' additional exercises to be carried out by the participants at home.[24]

The length of time an individual carries out these exercises will also determine their effectiveness in preventing falls. The evidence states that a minimum 'dose' of 50 hours should be given.[25] Again, with weekly classes, this equates to a course of around six months, and accounts for the long duration of the Otago and Postural Stability (Falls Management Exercise – FaME) programmes.[26]

Intensity

It is possible to improve muscle strength and balance irrespective of age, but in order for this to be effective in preventing falls and to be performed safely, it must be sufficiently challenging to and progressive for the individual.[27] This can be best ensured by employing professionals trained to deliver specialist falls prevention exercise programmes, as they can appropriately assess individuals at the outset of any intervention, adapt exercises where necessary and ensure participants are progressing at the right level, for example, by advising on the right number of repetitions and the use of support (eg. hand holds on chairs) progressing to no support.

Summary of evidence base for falls prevention exercise

- Balance impairment and muscle weakness are the most prevalent risk factors for falls and therapeutic exercise is the most effective component of a multifactorial intervention.
- A tailored programme for falls prevention can reduce the risk of falls by up to 54 per cent, but not all exercises are effective in preventing falls.
- In order to be effective, exercise programmes must:
    - Challenge balance and improve strength through resistance training and exercise in a standing position.
    - Be tailored to the individual, i.e. pitched at the right level, taking falls history and medical conditions into account.
    - Be sufficiently progressive.
    - Be carried out 2–3 times a week.
    - Be continued over a duration of at least 50 hours.
    - Be delivered by specially trained instructors.

23 Sherrington et al. 2011 'Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations,' *New South Wales Public Health Bulletin*
24 Royal College of Physicians. 2012. Older people's experience of therapeutic exercise as part of a falls prevention service. Patient and public involvement
25 ibid
26 ibid
27 ibid

4 *Evidence-based programmes*

Examples of evidence-based programmes

The following table outlines the most common evidence-based programmes for falls prevention, as well as some of the types of exercise that are often misconceived as falls prevention.

Type of exercise	Falls prevention?	Details
Tai Chi, dancing, gardening	**Yes** – Primary	Reduces risk of falls and is appropriate for younger-older adults (with only mild deficits of strength and balance) who have not experienced a fall.
Otago and Postural Stability (FaME/PSI) programmes	**Yes** – Secondary	Each exercise programme has been shown to prevent falls by as much as 35 per cent and 54 per cent respectively. Appropriate for older people at high risk of falls.
Chair-based	**No**	A modified evidence-based intervention, working towards reducing falls risk. Appropriate for those unable to exercise in a standing position, with or without support. Participants should be supported to progress according to their ability with the ultimate goal of building up to a level where they can take part in standing exercise and progress to an evidence-based programme for secondary prevention of falls.
Nordic walking, yoga	**No**	No evidence to support effectiveness in preventing falls though does help to maintain strength and balance (risk) and contribute to reducing risk in younger, fitter older adults or those not considered at risk.

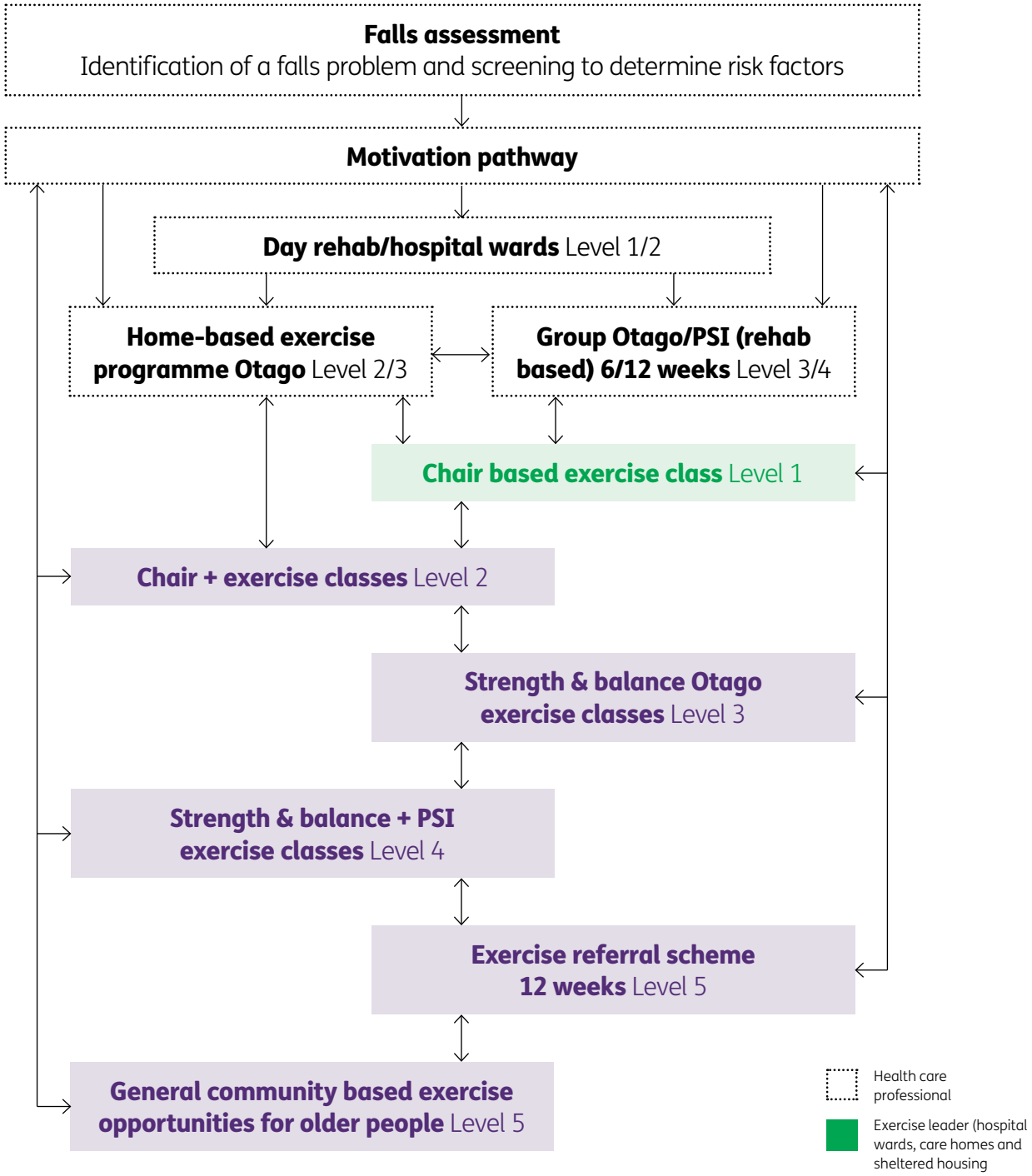
Exercise continuum

Some of these exercises contribute to building or maintaining strength and balance rather than reducing falls risk and should be considered an important part of the pathway or exercise continuum for older people. When pitched at the appropriate level and to the appropriate individuals, these classes will ensure participants are able to maintain strength and balance at a level which counteracts muscle deterioration and does not revert them to their pre-intervention risk of falls.

It is vital, therefore, that older people are assessed at the end of their evidence-based intervention and offered a range of follow-on classes which suit their needs and abilities, include strength and balance, and support them to progress. There is clear evidence of the negative impact that a lack of follow-up training has, so this transition pathway on to further exercise opportunities should be paramount.

The need for a range of 'maintenance' or follow-on activities in the community is also supported by the physical activity guidelines for older adults,[28] which recommend activities to improve muscle strength and balance on two or more days a week for all adults over 65.

The following diagram, produced by Cambridge Community Services NHS Trust Falls Prevention Services, outlines how an exercise continuum for preventing falls might look:



28 Department of Health. 2011. *UK Physical Activity Guidelines for Older Adults*

Secondary prevention programmes

As secondary prevention of falls can be more complex and follows specially designed programmes rather than a more general type of exercise, such as Tai Chi, this section provides further details on how these programmes should be carried out in order to meet the evidence base.

The two most common evidence-based programmes for preventing falls in the UK are Postural Stability (FaME/PSI) and Otago.[29] Both were designed through research trials exploring the specific components of exercise that are effective in preventing falls and have been rigorously evaluated and proven to work in practice. They therefore provide the clearest way of ensuring participants are meeting the guidelines set out in the evidence-base for falls prevention, provided they are delivered according to the original programmes, as follows:

Postural stability programme

- Based on Falls Management Exercise trial (FaME/PSI).
- Led by trained Postural Stability Instructor.
- Frequency: weekly class lasting between 45 and 75 minutes plus home exercise twice a week.
- Duration: at least 36 weeks.
- Exercise is modified according to individual progress, includes floor work to retrain getting off the floor and resistance bands and ankle weights for strength progression.
- Exercise meets the ACSM guidelines[30] for exercise for older people and therefore increases the likelihood that people will move towards meeting the UK physical activity guidelines.[31]

Otago home-based strength and balance exercise programme

- Developed by Otago University in New Zealand.
- Led by trained Otago Exercise Programme Leader.
- Frequency: participants are seen at home at least four times during the first eight weeks with a booster visit at six months. Participants are encouraged to perform the exercises at home at least three times weekly for one hour or more and also to walk indoors or outdoors on two other days of the week.
- Duration: participants are encouraged to continue the exercises for at least one year.
- Additional support is provided through telephone follow-ups each month between visits.

29 Royal College of Physicians. 2011. *Falling Standards, broken promises: report of the national audit of falls and bone health in older people 2010*
30 Nelson et al. 2007. 'Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association.' *Medicine and Science in Sports and Exercise*
31 Department of Health. 2011. *UK Physical Activity Guidelines for Older Adults*

5 Evidence in practice

Evidence in practice: service examples

The following are examples of where PSI programmes are being delivered according to the evidence base.

Age UK Oldham Falls and Injury Prevention Exercise Scheme

The scheme is run in partnership with Oldham Community Leisure Limited and funded by Oldham local authority. It was set up initially to complement local NHS physiotherapy services, which can only offer a limited programme due to the high number of people who fall and the demand on their service.

The scheme is targeted at older people who have experienced falls or are considered to be at high risk of falling (including older people recovering from stroke and those who have had a 'minor' fall).

Classes are delivered by trained fitness instructors who undergo intensive Postural Stability Instructor training. This is a level four qualification on the register for exercise professionals. The class aims to improve balance and increase local muscular strength, co-ordination and self-confidence.

Referrals are accepted from GPs and other health professionals. Clients are initially referred to the physiotherapy falls service for a multifactorial assessment. They use a Falls Risk Assessment Tool (FRAT) which also includes a home assessment check.

Following these assessments, suitable participants are referred from the physiotherapy team to Age UK Oldham Falls Prevention Exercise Scheme. Participants are offered up to six months of falls prevention classes. Each participant attends two sessions per week and is also provided with an exercise DVD and encouraged to use this at home between classes.

The classes take place at various venues throughout Oldham and transport is provided to the classes if required. Both the class and transport are free.

Participants are assessed and functional tests (e.g. Timed Up and Go) are carried out at the start of the scheme, three months after starting and at the end of the scheme to monitor progress. These assessments then determine if participants are ready to move on to other established activities such as the 'Next Steps' scheme.

The 'Next Steps' scheme is an intermediate class (funded by Oldham local authority) aimed at bridging the gap between the initial 'falls prevention' classes and mainstream leisure activities. Clients are offered up to six months of classes. These are free but participants need to arrange and pay for their own transport.

Once people have completed the full 12 months of Falls and Injury Prevention Exercise Scheme and 'Next Steps' they are supported to move onto community based classes.

Oldham Community Leisure hold 10 chair based exercise classes throughout Oldham. The PSIs deliver these classes and they therefore know people from the falls courses, which mean they are familiar with their abilities. The older people also feel reassured and familiar with the PSIs. These classes cost between £2 and £3.

A pilot scheme is currently in progress for Otago falls sessions to be delivered in older people's homes, under the supervision of the falls physiotherapist. Alongside the Otago sessions within their home, the participants also attend one class a week with the PSI team through Age UK Oldham.

Falls Prevention Service in Cambridgeshire – provision of Postural Stability and Otago exercise classes

Cambridgeshire Community Services NHS Trust trains both healthcare professionals and exercise professionals working in local statutory bodies and the voluntary sector to deliver evidence based PSI and Otago falls prevention exercise programmes in the community. An exercise continuum operates (see above) so that participants can move from an NHS-led programme to community class or vice versa with ease.

Staff working in the NHS must have at least either PSI or Otago training or be supervised by a member of staff who has successfully completed the training. Exercise instructors working in the community may only advertise their classes in the 'Forever Active' (see below) termly brochure if they have the appropriate qualifications for the classes they are teaching.

The NHS-led strength and balance classes are delivered over 12 weeks alongside the home-based exercise programmes (Otago). At the end of the 12 weeks participants are expected to attend a community class and/or continue in their own home. Community classes are held in a variety of venues including village and church halls, sheltered housing and leisure centres. Transport to NHS falls classes may sometimes be provided, however transport is not provided for classes in the community. There are local transport schemes where participants can 'dial a ride' or opt for a lift sharing scheme for example.

Baseline and end of programme assessments are carried out, including the Tinetti Balance Assessment tool, Timed Up and Go, establishing goals achieved and the Visual Analogue Scale for fear of falling. Qualitative outcomes have included feedback on being able to use buses and therefore increased independence, being able to visit family who have stairs and also enabling participants to have the confidence to go on holiday.

Referrals into the NHS programme come from health care professionals, GPs, consultants, nurses, self-referrals, families, neighbours, sheltered housing scheme managers and carers. Promotional materials are used to advertise services to potential referrers, alongside a validated Later Life Training programme. Local authorities, sheltered housing and care agencies pay for training for appropriate staff.

The NHS-run classes are free but there is a charge for most of the community based classes. Many of the community classes are now run as part of 'Forever Active', an independent organisation run by local older people. Independent exercise instructors can choose to work as part of 'Forever Active' which means their classes are advertised free of charge, and class participants know the instructors are appropriately qualified and monitored regularly.

Age UK Doncaster Strength and Balance classes

Age UK Doncaster has been providing Strength and Balance training for three years on a weekly basis in two local venues. The sessions are delivered by Postural Stability Instructors as part of the 'Active in Later Life' programme. The sessions offer an intervention of 48 weeks with the suggestion of additional twice-weekly activity taken from an exercise booklet. Participants are asked to record the exercises they have undertaken in a diary.

Transport is provided to and from the venues and sessions also take place in supported living housing schemes. A small charge of 50p is made to cover the cost of refreshments which are provided at the end of the session.

At the outset of the intervention, the PSIs work with participants to undertake functional assessments, including Timed Up and Go, Sit to Stand and Functional Reach, in order to assess their capabilities and to ensure that the sessions meet their individual needs.

Participants' progression is monitored at regular intervals and functional gains recorded. This helps to signpost participants onto other activities when it is time for them to move on to a community based activity.

Referrals mainly come from occupational therapists and physiotherapists who have worked with participants as part of the falls rehabilitation service at the local hospital. There are also referrals from community health workers and wellbeing officers of the local authority, from GP practices and by self-referral.

The 'Active in Later Life' programme is currently funded by the NHS in Doncaster.

In 2012 Age UK Doncaster provided 96 strength and balance classes with over 500 participants. The 'Active in Later Life' Annual Review reported that: '88 per cent of those attending balance & strength sessions felt an improvement in overall strength, particularly when standing'.

Buckinghamshire Healthcare NHS Trust Postural Stability Instructor classes

'Get Fit, Avoid Falls' classes are a joint venture between Buckinghamshire County Council, Buckinghamshire Healthcare NHS Trust and Greenwich Leisure Ltd (GLL), a social enterprise leisure trust. The classes have been running since 2003.

Classes were originally eight weeks of exercise and education run by a physiotherapist and a physiotherapy assistant solely in sheltered accommodation. Over the years the classes have developed into a postural stability programme. All instructors on 'Get Fit, Avoid Falls' are now Postural Stability Instructors.

Within Buckinghamshire two levels of programme currently run:

Level 1

- classes last 12 weeks
- delivered by PSIs within the Community Falls Service who are also physiotherapists, occupational therapists or therapy assistants
- free transport is provided to the venue
- Buckinghamshire NHS funds the staff costs for Level 1 classes and the County Council funds the venues and transport and the freelance PSIs.

Level 2

- classes last a minimum of 24 weeks
- GLL run the Level 2 classes in the South Buckinghamshire area
- the Community Falls Service coordinates the classes in the rest of Buckinghamshire
- freelance PSIs or their own employed PSIs are used to deliver the classes
- Level 2 classes cost £2.50 per session and transport is not provided.

Each Level 1 class is followed by a Level 2 class. Most clients will move from Level 1 into Level 2 but those that are able enough can enter direct to a Level 2 class.

In South Buckinghamshire the Level 2 classes are not limited to 24 weeks and become what are called 'maintenance classes'. In some other areas the freelance PSIs have also set up maintenance classes for those that wish to continue exercising.

At the end of the programme there are a variety of options according to area. Some areas continue with PSI classes whereas some clients are directed to Tai Chi.

The main referral methods include self-referrals, GPs, health professional and carers.

Buckinghamshire County Council supports Level 1 and some Level 2 classes by paying for the cost of venues, transport (Level 1 only) and some instructors, who are not part of the falls service.

In 2012, 134 participants completed the Level 1 programme. The assessments used are the Berg Balance Scale, Falls Efficacy Scale–International (FES-I), Goal Attainment and ability to get up off the floor. Before undertaking the programme only 49 per cent of participants were able to get up off the floor independently. After completing the programme 86 per cent of participants were able to achieve this.

Age UK Cornwall & The Isles of Scilly – Postural Stability Instructor classes

Age UK Cornwall has been running Balance and Stability classes in three locations for over three years, working closely with GP practices in Cornwall. The courses are 20 weeks in duration and at the end of the course, the participants are moved onto a step down class which is more challenging and provides people with an exit route.

Participants are charged £3 per class which enables the classes to be self-funding. Age UK Cornwall has found that the majority of people are prepared to pay the nominal fee when they see how the exercise will improve their mobility and therefore the impact on their daily lives. All classes are held in Village Halls or Community Centres which are easily accessible and have parking or are on a bus route.

The participants came initially from GP referrals, but more and more are self-referring, hearing about the class from friends and families. To date Age UK Cornwall has reduced the number of falls in over 50 out of 68 participants.

All participants undergo a functional grid assessment which includes the Timed Up and Go test and ConFbal test at the start of the exercise programme, and again at 20 weeks. Testing is undertaken by Age UK Cornwall's PSI to ensure the class is suitable for each older person's needs and so that each can be signposted to the appropriate class.

Conclusion

The NICE guideline on the assessment and prevention of falls in older people is clear that strength and balance training is a key component of successful multifactorial intervention programmes.[32] This guide aims to set out the evidence base for what works in strength and balance training, and to highlight some of the programmes around the country which have incorporated this evidence into their falls prevention services.

The need has never been greater to ensure that resources are targeted where they are most effective and to focus on activities which will prevent the need for acute hospital care and long-term social care. It is hoped that this guide will help to clarify what is needed to deliver evidence-based falls prevention exercise and to illustrate a range of ways in which this has been done.

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