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# Strength and balance quality markers

## Supporting improvement through audit

Produced by Public Health England with the National Falls Prevention Coordination Group member organisations. July 2019.

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# Purpose

The National Falls Prevention Coordination Group (NFPCG) is made up of organisations involved in the prevention of falls, care for fall-related injuries and the promotion of healthy ageing. It was formed with the aim of coordinating and supporting falls prevention activity in England.

While there are currently a number of national clinical audits relating to falls and fracture care, these focus on hospital settings. Therapeutic strength and balance exercise is a key falls prevention intervention that is largely delivered in the community. However there is significant diversity in the way that it is delivered. The National Institute for Health and Care Excellence (NICE) notes that:

'While data on fragility fractures and inpatient falls are provided by key national audits, data on falls prevention, particularly in the community, are lacking.' [i]

This document details 7 quality markers for strength and balance exercise that can be used as criteria supporting local areas in carrying out self-audit for quality improvement.

The intended audience for this document is both local commissioning and strategic leads in England with a remit for falls, bone health and healthy ageing and providers of strength and balance falls prevention exercise.

## This paper has been endorsed by the following organisations:

# Background

The risk of falls and fall-related injuries such as fractures increases with age. They are a common and serious health issue faced by older people in England. The human cost can include distress, pain, injury, loss of confidence, loss of independence and mortality. For health services they are both high volume and costly.

Around 24% of men and 30% of women aged 50 years old and over report having fallen in the previous 2 years, with 7% of men and 11% of women aged 50 years and over reporting having had a fall that required medical attention. [ii] In 2017/18 there were 220,160 falls-related emergency hospital admissions among patients aged 65 and older. [iii]

Strength and balance exercise interventions can prevent some falls and fractures, resulting in improved health outcomes and independence for older people, and reduced demand for health and care services. However, audits have shown variation in coverage and uptake and there is an absence of data on the quality of the interventions being delivered. [iv] [v] [vi]

# Muscle strength and balance

Strength is a function of muscle and bone mass, both of which decline with age. [vii] Muscle mass declines by 0.5% to 1% per year after 50 years of age and 2% to 4% after 75 years of age. The loss of physical strength can be 2- to 5-times faster due to muscle quality and neural factors. Similarly, peak bone mass is reached from the mid to late 20s, with bone mineral density (BMD) decreasing by around 0.5% per year from age 40. Following menopause women lose 2% to 3% BMD per year. Older adults can experience balance deficit due to central nervous system declines and changes in sensory receptors, muscles and peripheral nerves. [viii]

The World Health Organisation notes that physical activity is a key protective factor supporting healthy ageing. [ix] Preserving musculoskeletal function through physical activity and exercise is a necessary requirement for maintaining mobility and independent living during later life. [x]

Muscle weakness and impaired balance are significant risk factors for falls. [xi] A review of the literature found that low levels of muscular strength, power and balance in older adults were associated with increased risk of a first fall, recurrent falls and falls that lead to injury.

The UK Chief Medical Officers' physical activity guidelines recommend that older adults should undertake activities aimed at improving muscle strength and balance on at least 2 (preferably non-consecutive) days a week. These could be incorporated within the same sessions with a mix of multi-component activities. [xii]

Muscle strengthening and balance improvement physical activities can take place within a number of contexts. They are necessary for carrying out activities of daily living – getting dressed requires balance and strength is needed to carrying shopping. Many types of sport and exercise have a positive impact on muscle and balance outcomes. A review of the literature found that ball and racquet sports, aerobics and circuit training, resistance training and Nordic walking had a strong or medium effect on muscle function and improving balance. [xiii] Exercise interventions can be delivered within a therapeutic context with the specific goal of preventing falls. It is important to note that there is currently only evidence that specific types of exercise intervention are able to prevent some falls. There is not robust evidence that other forms of sport, exercise or activity as part of daily living prevent falls although these can reduce exposure to risk factors.

## Effective strength and balance exercise programmes

Effective muscle strengthening and balance improvement programmes aimed at preventing falls should consist of a programme of one-to-one or group balance and task training exercises, plus resistance exercises delivered by an appropriately

qualified instructor. Programmes should comprise a minimum of 50 hours with a weekly ‘dose’ of at least 2 to 3 hours. [xiv] [xv] [xvi] [xvii] There are different programmes that are more or less suitable for people with different levels of capacity, motivation and confidence and a person centred pre-assessment needs to take place to ensure that participants are on the right programme. [xviii]

The exercises should be progressive in terms of intensity and challenge, and individualised. The balance training should be highly challenging in that it involves movement of the centre of mass, narrowing of the base of support and minimising upper limb support. It should range from the re-education of basic functional movement patterns to a wide variety of dynamic activities that target more sophisticated aspects of balance and allow reactive strategies to recover balance to be practiced. [xix] The weekly dose can comprise a proportion of unsupervised ‘homework’ exercise, but this needs to be encouraged and monitored.

Given current population levels of physical activity, engaging in a programme of minimum dose and duration will require a significant increase for many participants.[xx] Commissioners and providers should ensure that barriers are addressed and participants are motivated at both individual and system levels. This includes:

- raising awareness that falls are not an inevitable part of ageing and what older people can do to prevent them
- encouraging uptake including establishing effective referral pathways
- using a person-centred and evidence-based approach
- monitoring outcomes [xxi]

As benefits are progressively lost once physical activity ceases, completing a programme of minimum effective dose and duration should not result in an assumption that no further action is required to maintain the reduction in falls risk. At the end of the programme participants should be assessed, offered and enabled to take up a range of follow-on classes and physical activity opportunities that involve continued strength and balance activities. These should suit their needs and abilities, include strength and balance, and support their progression.

The Cochrane Library systematic review on falls prevention and exercise states that there is moderate certainty evidence that balance and task training exercise combined with resistance exercise reduces the rate of falls by 34% and the number of older people who fall by 22%. [xxii] [xxiii] In addition to this, class-based falls prevention exercise has been shown to increase overall levels of physical activity. [xxiv]

The National Institute of Health and Care Excellence (NICE) states that older people reporting a fall or considered at risk of falling should be observed for deficits in balance and the way in which they walk (gait) and considered for their ability to benefit from interventions to improve strength and balance. [xxv] In addition to this, interventions to improve strength and balance are recommended as components of multifactorial interventions following a multifactorial falls risk assessment. These are recommended for older people who present for medical attention because of a fall, or report recurrent falls in the past year, or demonstrate abnormalities of gait and / or balance.

# Audit for quality improvement

## Defining clinical audit

Clinical audit is a quality improvement process that seeks to improve patient care and outcomes by systematically reviewing care against agreed criteria. [xxvi] [xxvii] Following the assessment of data collected relating to these criteria, changes in delivery are implemented and further monitoring is carried out to confirm if improvement has taken place. The cycle is repeated on an ongoing basis to bring about incremental but continual improvements in care. This process can be used to support improvement in the quality of muscle strengthening and balance improvement falls prevention programmes. Clinical audit data can also provide valuable intelligence relating to service effectiveness and the distribution of health, illness and disease in populations.

**Figure 1: Stages of the audit cycle**


The clinical audit cycle comprises of 4 main stages.[xxvii]

## Preparation and planning

This stage involves selecting a specific topic and agreeing the audit criteria - statements relating to evidence based standards that define the element of care being measured. It also involves agreeing standardised data collection methods.

## Measuring performance

This stage involves collecting the data, analysing the data in relation to the audit criteria and feeding back the results.

## Implementing change

Following receipt of the results, there is a need for discussion and agreement on what aspects of care need to be changed and how to do this. One way in which change can be implemented is using the Plan-Do-Study-Act (PDSA) cycle which involves repeated rapid small-scale tests of change to see whether and to what extent the changes work, before implementing on a larger scale. [xxviii]

## Sustaining improvement including re-audit

Once the changes have been implemented, a period of time is allowed to elapse while the changes are allowed to embed. Then a second set of data are collected using the same data collection methods. This second set of data is analysed and the results are fed back. There is discussion as to whether and to what extent the care has improve and following this, the process is repeated, and then repeated again as part of a cycle of continuous quality improvement.

## Clinical audit and falls

There are a number of national clinical audits relating to falls and fall-related injuries. However, the National Institute for Health and Care Excellence notes that:

‘While data on fragility fractures and inpatient falls are provided by key national audits, data on falls prevention, particularly in the community, are lacking.’ [xxix]

Given that strength and balance exercise is a key falls prevention intervention, this document details seven quality markers / audit criteria that will support local areas in carrying out self-audit of their services. Data are collected nationally for two of these. The other 5 will require local data collection. These are detailed in the next section.

# Quality markers / audit criteria

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|---|---|
| 1. Population level physical activity | |
| Description | There is a documented programme of work aimed at increasing levels of physical activity amongst the general population across all of the domains in the CMOs' physical activity recommendations. |
| Measure | Numerator: Number of adults aged 19 years and over that are physically inactive (less than 30 moderate intensity equivalent minutes per week).<br><br>Denominator: total adult population aged 19 years and over in area. |
| Data source | Public Health Outcomes Framework: Percentage of physically inactive adults – current method. |
| Issues | Physical activity in line with the CMOs' recommendations needs to take place across all stages of the life course including mid-life and older age. While this indicator measures inactivity in terms of aerobic physical activity, it assumes that inactivity is occurring across all domains of the CMO's recommendations, and that conversely, people active in line with the recommendations are active across all the domains. Many types of sport and exercise do have a positive impact across a number of domains. There is evidence that participation in strength and balance classes increases overall physical activity levels. |
| 2. Integrated care | |
| Description | All programmes to have documented referral or eligibility criteria and pathways to effective evidence based muscle strengthening and balance improvement falls prevention exercise programme including from services whose remit covers fall-related injuries, including Fracture Liaison Services. |
| Measure | Numerator: number of non-hip fracture Fracture Liaison Service patients initiating an evidence-based strength and balance programme within 4 months of date of fracture.<br><br>Denominator: number of Fracture Liaison Service patients with a bone therapy treatment recommendation or referral to GP or referred to other clinician minus patient dead. |

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| Data source | RCP Falls and Fragility Fractures Audit Programme FLS-DB clinical audit data. |
| Issues | Patients with fall-related injuries such as fragility fractures should have their falls risk assessed and be provided with interventions to reduce risk. These may well be provided by different professionals and organisations and so require coordinated and integrated working across local systems.<br><br>Assessment of this indicator should also take into account the annual number of patients that a fracture liaison service should be seeing in a given area. This can be roughly calculated by taking the number of annual hip fracture patients in the area and multiplying this figure by 5. |
| 3. Provision of evidence-based muscle strengthening and balance improvement exercise programmes | |
| Description | People aged 65 years and over at risk of recurrent and / or injurious falls or those who have been experiencing recurrent and / or injurious falls have access to an evidence-based progressive, challenging and individualised muscle strengthening and balance improvement falls prevention exercise programme of adequate duration and dose. |
| Measure | Numerator: number of participant places for people aged 65+ provided on evidence-based muscle strengthening and balance improvement falls prevention programmes.<br><br>Denominator – total number of adults 65 years and over population in area. |
| Data source | Local collection. |
| Issues | While strength and balance programmes are targeted at older people at risk of, or who have been experiencing recurrent or injurious falls, it is not currently possible to assess population levels of falls risk. This indicator assumes equivalent levels of risk amongst populations in different geographical areas. |
| 4. Completion of muscle strengthening and balance improvement falls prevention exercise programmes. | |
| Description | Organisations and professionals who plan, commission and / or provide muscle strengthening and balance improvement falls prevention exercise programmes take action to enable uptake and |

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|---|---|
| | completion of programmes, ensuring population level improvement in older people's muscle strength and balance. |
| Measure | Numerator: number of people aged 65+ years completing evidence based muscle strengthening and balance improvement falls prevention programmes (75% attendance).<br><br>Denominator: total number of adult 65 years and over population in area. |
| Data source | Local collection. |
| Issues | There are a number of ways in which local areas can increase uptake and completion of falls prevention exercise programmes. [xxx] These include challenging negative beliefs about ageing; providing person centred goals to increase motivation; building relationships across organisations; providing a choice of different exercise sessions; and addressing particular barriers including those relating to time, cost, transport, venue, instructor and accessibility. |
| 5. Participant adherence to muscle strengthening and balance improvement falls prevention exercise programmes | |
| Description | Participants commencing evidence-based muscle strengthening and balance improvement exercise programmes are enabled to complete the programme. |
| Measure | Numerator: number of adults aged 65 years and over completing (75% attendance) evidence-based muscle strengthening and balance improvement falls prevention exercise programme.<br><br>Denominator: number of adults aged 65 years and older commencing programme. |
| Data source | Local collection. |
| Issues | See comments for previous quality marker 4 regarding increasing uptake and completion. However quality marker 4 relates to the proportion of people receiving the intervention in a population. This quality marker relates to the proportion of participants adhering to the programme. |

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| 6. Demonstrating improvements in gait and balance | |
| Description | Completion of evidence-based muscle strengthening and balance improvement exercise programmes should result in improved outcomes. Providers should assess all participants in a number of areas pre-intervention and upon completion (75% attendance). They should use a number of tests including Timed Up and Go, 30 second chair rise and Falls Efficacy Scale – International (FES-I). Providers should record participant falls on a register for the first 12 weeks of a programme then follow up 12 weeks after programme, recording the number of falls experienced during the previous 12 weeks |
| Measure | Numerator: number of participants with a 20% or greater reduction in Timed Up and Go score – measurement taken prior to commencing programme and post programme completion. [xxxi]<br><br>Denominator: total number of participants completing programme |
| Data source | Local collection. |
| Issues | Given that self-report of falls can be unreliable, measurements of improvement in mobility (Timed Up and Go), leg strength (30 second chair rise) and fear of falling (FES-I) should be taken as proxy indicators demonstrating improved outcomes. However, these are surrogates for falls risk and should not replace the need to collect data on falls and fall-related injuries. Given the lack of a control group, improved participant outcomes can be a result of reversion to the mean as well as the effectiveness of an intervention. It should be noted that this is a measure of an average rather than a minimum level of improvement.<br><br>If a participant reports falls subsequent to completion to the programme when being followed up they should be advised to contact their GP or other healthcare professional. |
| 7. | Maintaining activity |
| Description | All programmes to support participants in maintaining strength and balance physical activity levels through promoting and enabling strength and balance physical activity opportunities suiting participants' needs, preferences and abilities, and supporting their progression. |

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|---|---|
| Measure | Numerator: Number of participants reporting the following minimum physical activity levels in line with the CMOs' strength and balance recommendations three months after completing the programme. All participants contacted to be asked: "In the last seven days (not counting today), did you engage in any of the following physical activities: ball games; circuit training; cycling; dance; Nordic walking; racquet sports; running; tai chi; weight training involving free weights, machines or bands; or yoga?" If yes to any of these then participant to be asked on how many occasions.<br><br>Denominator: Number of participants completing programme. |
| Data source | Local collection. |
| Issues | In order to maintain reduced falls risk and to improve health and wellbeing, it is important that participants are supported in maintaining physical activity levels. This will require joined up and effective working between local commissioners and providers of physical activity opportunities. The CMOs recommend that adults aged 65 and older should engage in muscle strengthening activities on at least 2 occasions per week and activities that improve balance and coordination on at least 2 occasions per week. The activities listed in the numerator have an effect on both strength and balance. [xxxii] While walking has a low effect on muscle function, it has not been included in the list given that inclusion is likely to result in overestimation of physical activity levels. |

# Resources

## Strength and balance

Centre for Ageing Better. Raising the bar on strength and balance: the importance of community-based provision. 2019.

NICE CG 161 Falls in older people: assessing risk and prevention. 2013.

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[iv] Royal College of Physicians. Falling standards, broken promises: report of the national audit of falls and bone health. 2013.

[v] Royal College of Physicians. Fracture Liaison Service Database (FLS-DB) facilities audit FLS breakpoint: opportunities for improving patient care following a fragility fracture [Internet]. 2016.

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[xxx] Centre for Ageing Better. Raising the bar on strength and balance: the importance of community-based provision. 2019.

[xxxi] Timed Up and Go benchmarking data: i) Mid-Sussex Well Balanced Programme October 2015 to August 2018 – 246 participants, 30 week programme duration, 4.49 secs / 21% mean reduction; 80 participants, 24 week programme duration, 4.60 secs / 24% mean reduction
ii) PhISICAL Study, University of Nottingham – 203 participants, 24 week programme duration, 4.00 secs / 22% mean reduction
iii) Newcastle Healthworks Programme 2017/18 – 104 participants, 28 week programme duration, 4.80 secs / 40% mean reduction
iv) RoSPA Stand Up Stay Up Evaluation 2018/19 across 12 local authority areas – 209 participants, varying programme lengths 4.9 secs / 25% mean reduction.

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