



Falls and Secondary Fracture Prevention

3

Julie Santy-Tomlinson, Robyn Speerin, Karen Hertz,
Ana Cruz Tochon-Laruaz, and Marsha van Oostwaard

The most common cause of fractures in the elderly is falling, usually from standing height, and falling is the leading cause of hospitalisation due to accidental injury, with significant risk of death in the following year due to complications [1]. Low bone density due to osteoporosis or osteopenia means that falls easily result in fractures, even when the fall dynamics are relatively mild, as discussed in Chap. 1. These are often referred to as ‘fragility’, ‘osteoporotic’ or ‘minimal trauma’ fractures and most commonly occur in those over the age of 50 years [2], the same population at risk of osteoporosis.

The cumulative risk of fragility fractures is reported to be 51% for women and 20% for men [3], representing a significant challenge to health services. Up to 5% of falls result in fracture and 1% in hip fracture, but it is estimated that the incidence of hip fracture could increase by as much as 66% by 2021 [4]. A hip

J. Santy-Tomlinson (✉)

Division of Nursing, Midwifery and Social Work, School of Health Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester, UK
e-mail: Julie.santy-tomlinson@manchester.ac.uk

R. Speerin

Musculoskeletal Network, NSW Agency for Clinical Innovation, Chatswood, NSW, Australia
e-mail: Robyn.speerin@health.nsw.gov.au

K. Hertz

Specialised Division, University Hospital of North Midlands,
Stoke-on-Trent, Staffordshire, UK
e-mail: Karen.hertz@uhnm.nhs.uk

A. C. Tochon-Laruaz

Division of Bone Diseases, Geneva University Hospitals, Geneva, Switzerland
e-mail: ANA.CRUZ@HCUGE.CH

M. van Oostwaard

Máxima Medisch Centrum, Eindhoven, The Netherlands
e-mail: M.vanOostwaard@mmc.nl

© The Editor(s) (if applicable) and the Author(s) 2018

K. Hertz, J. Santy-Tomlinson (eds.), *Fragility Fracture Nursing*, Perspectives in Nursing Management and Care for Older Adults, https://doi.org/10.1007/978-3-319-76681-2_3

fracture has the greatest impact on the individual of all fragility fractures and is associated with the worst morbidity, mortality and functional ability outcomes from fractures [5]. It leads to extensive hospitalisation and can result in major complications and death [6]. Even minor fractures, such as those of the wrist, can lead to significant impairment and early mortality, independent of any contributing co-morbidities [7]. Older people who are healthier and more active can sustain fractures much later in life, making their care more complex [8]. Hence, there is an imperative to support successful primary and secondary prevention of falls and osteoporosis.

The prevention of falls is central to preventing fractures; their impact is far-reaching and includes physical, psychological and social effects. Falls and fear of falling can lead to impaired mobility and fear of further falls resulting in isolation, reduced self-esteem, anxiety and depression; so it is the impact of a fall or multiple falls that must be considered, even without a fracture. Those whose low-impact fall results in a fracture need holistic, person-centred assessment and secondary fracture prevention, identifying osteoporosis and initiating and sustaining treatment as well as preventing future falls. Models of care for secondary or refracture prevention have been implemented internationally over the past 15–20 years and are commonly known as ‘Fracture Liaison Services’. These services aim to identify people who have sustained a fragility fracture and help them to gain access to their required treatment and support to sustain therapies known to reduce the incidence of further fractures. Treatment and supportive follow-up are known to prevent at least 50% of projected subsequent fractures but, despite the hallmark of having had a fragility fracture, many with osteoporosis remain undiagnosed and untreated [9]. This chapter aims to discuss the prevention of falls and secondary fractures through evidence-based interventions and services.

3.1 Learning Outcomes

At the end of this chapter and following further study, the nurse will be able to:

- Identify the causes of and risk factors for falling
- Employ evidence-based nursing interventions for the prevention of falls
- Instigate and coordinate falls prevention strategies in people who sustain fragility fractures
- Define the concept of secondary fracture prevention
- Explain the need for coordinated secondary fracture prevention through pathways and models of care such as Fracture Liaison Services
- Discuss the role of the practitioner in secondary fracture prevention and Fracture Liaison Services
- Outline how secondary refracture prevention services can be developed, implemented and evaluated.

3.2 Falls

Falls predominantly occur in people over the age of 65 years. Eighty percent of fractures of the axial skeleton result from a fall [6]. Approximately 30% of older people fall at least once per year, depending on age, gender, country and ethnicity, increasing to 50% of those over the age of 80 years, especially those living in residential care facilities. Half of those who fall do so repeatedly. Falls are multifactorial and research has reported numerous causes and risk factors in older people [10].

3.2.1 Causes of and Risk Factors for Falls

Understanding the reasons why older people fall is an important part of assessment leading to evidence-based intervention and should be an integral part of the comprehensive assessment process discussed in Chap. 4. Many research teams have investigated the factors most likely to lead to an individual falling:

Intrinsic factors: person-specific, including characteristics of the individual and their medical conditions such as sarcopenia and other age-related conditions. These include age, gender, gait, fitness, balance, strength and aerobic fitness, vertigo and dizziness, impaired vision and hearing, cognitive impairment, cardiovascular disease, medications (particularly psychotropic) and depression [11].

Extrinsic factors: environmental factors that present fall hazards in the home and external environment such as footwear and clothing, home lighting, flooring, tripping hazards, lack of grab bars and unstable furniture [11].

3.2.2 Screening and Assessment

The purpose of screening and assessment is to facilitate interventions that will help reduce the incidence of falls and their consequences. The terms screening and assessment tend to be used interchangeably, but screening determines if assessment is required, and assessment involves gathering more detailed information needed to direct a prevention plan that meets individual needs and wishes. Many tools are available to help practitioners undertake screening and assessment for falls.

All older people, whether living in the community or in residential care, should be regularly screened for risk of falling, so that detailed assessment and multidisciplinary interventions can be offered. The most important screening approach is to routinely ask all older people presenting for health care if they have fallen in the past year [12] followed by asking about the frequency and nature of their fall/s. Observing the way that older people move is a simple way to identify those who are at risk; look for slow, asymmetrical, shuffling and unstable gait. If the person struggles to stand from a chair, it indicates a falls risk because of reduced

muscle strength. These observations can identify those who require interventions for sarcopenia (described in Chap. 2). Examples of validated screening tools are listed in Box 3.1

Box 3.1: Examples of Screening Tools for Falls in Older People

Modified falls efficacy scale [13]: a 14-item patient-reported measure regarding their confidence in activities of daily living.

Timed Up and Go test (TUG) [14]: the person is timed getting up from a chair, walking 2 metres, walking back to the chair and sitting down. The time taken indicates the falls risk [10].

Thirty-second chair stand [15]: focused on functional ability related to repeated standing from a chair.

Tinetti balance assessment tool [16]: detailed assessment of balance and gait focused on chronic disabilities.

3.2.3 Falls Prevention Strategies

Falls prevention strategies are complex. The most appropriate prevention interventions to reduce fractures depend on the risk profile [6] and, for those in hospital, the place of planned discharge is an important consideration. Interventions may be multifactorial with multiple components aiming to address individual risk factors [14]. Strategies may include:

- Environmental adaptations
- Exercise programmes—strength, balance and cardiovascular training
- Assessment of vision and referral
- Medication review and modification
- Review of feet and footwear.

3.2.3.1 Environment

Most falls occur in the home [18]. Whether the person lives at home, or is hospitalised and is likely to be discharged home, an assessment of the home is essential in identifying environmental changes needed as part of a multicomponent strategy. Assessment should be undertaken by a health/social care professional with the skills to identify problems and recommend adaptations. A home assessment will capture issues relating to flooring, lighting, unstable furniture, access to toilet and bathroom, tripping hazards, safety of cooking facilities and other aspects of the home and garden which may contribute to falls. A plan for adaptation of the home can involve, for example, simple measures such as removing rugs and other tripping hazards, rearranging furniture and providing simple aids such as commodes and raised toilet seats. More complex adaptations can include the installation of grab rails, alarm systems and other building adaptations [6]. Residential care facilities need to be environmentally designed with these principles in mind.

3.2.3.2 Exercise

Exercise strategies for falls prevention focus on balance, strength training and aerobic fitness to improve the individuals' postural stability and ability to resist falling. Group and home-based exercise programmes can reduce the rate of and risk of falls [19] along with some effect on fear of falling [20]. Supervised exercise sessions are recommended at the outset to work towards improved strength and stability before embarking on a self-led home exercise programme [6]. Physiotherapists or exercise physiologists are ideal team members to supervise regular training sessions that include different exercise modalities [21].

3.2.3.3 Vision

Visual impairment is a common contributor to falls risk; affecting balance, ability to avoid obstacles, judgement of distance and spatial awareness [11]. Formal assessment of vision should be offered, along with reduction of environmental hazards and support for the individual's own coping mechanisms.

3.2.3.4 Medication Review

The use of multiple medications in older people can be a significant cause of falls, particularly psychotropic drugs [22]. As part of the CGA process discussed in Chap. 4, a review of medication use is essential. NICE [12] recommends that, with specialist advice, those taking psychotropic medications, in particular, should have their dose reviewed or discontinued. A review of cardiac medications should also be undertaken so medications can be reduced, if required, with as little cardiovascular risk as is possible. Hypotension is a common cause of falling, but some medications are known to improve quality of life in those with heart failure. While hypotension is common in heart failure, with no resultant dizziness, these medications should be titrated only with judicious cardiology expertise in order to provide the person with as much quality of life while living with heart failure but to also reduce falls risk.

3.2.3.5 Footwear and Foot Care

Modification of footwear and care of feet is a fundamental aspect of falls prevention. Foot pain and weakness, reduced range of motion, deformity and inappropriate footwear are all risk factors [23]. Many people at risk of falls will have type 2 diabetes, so it is important to help them understand the need for inspection of feet daily, including the soles of the feet, especially when starting an exercise programme, in order to identify potential ulcers or broken skin at the earliest possible stage of development. All older people should be advised to wear supportive shoes rather than wear slippers or walk in socks in the home [24]. The podiatrist is an important member of the MDT and needs to be consulted for expert management when foot problems are identified [23].

3.2.3.6 Fear of Falling

Fear of falling is a psychological consequence of previous falls. Fear leads to anxiety, loss of confidence and isolation due to decreased activity, and this increases frailty and the likelihood of further falls [25]. Practitioners recognise fear of falling

that as reluctance to mobilise. It is revealed as anxiousness when asked to try mobilisation, along with clutching and grabbing. This is a complex problem that needs a multifactorial, multidisciplinary approach. Although there is limited evidence relating to specific interventions to reduce fear of falling [26], practitioners can mitigate the effects of fear by the use of strategies that include gradually and sensitively reintroducing the person to remobilisation using realistic short- and long-term goal setting, supporting attempts to mobilise with encouragement and use of mobility aids, allowing plenty of time for completion of activities and offering plenty of opportunities to practise a little and often.

3.2.3.7 Falls Pathways and Guidelines

Falls prevention pathways and guidelines have been developed to guide effective assessment and the planning, implementation and evaluation of multicomponent interventions. Local guidelines will help to guide practice. These pathways and guidelines facilitate collaboration and integration to bring emergency services, acute, secondary and primary care services together to coordinate care. The inclusion of people who require the pathway (and their families or carers) in decision-making is facilitated through education and information about what can be achieved through the activities of falls prevention [12].

3.3 Secondary Fracture Prevention

Sustaining a fragility fracture is the signal that more fractures will occur, so health care that is known to prevent greater than 40% of the refractures must be instigated [27]. Unfortunately health-care systems across the globe often fail to provide this care because:

1. No one professional group takes responsibility for identifying and treating this patient group.
2. As people with fragility fracture are not advised of their high potential of having osteoporosis, they never report this condition in surveys, so the subsequent population numbers of those with osteoporosis are reported erroneously to be low.
3. Coding in health records is poor due to clinical teams not using terms in their medical records that inform the coder to report fragility fractures.
4. A lack of international codes to use, even when the fragility fracture is identified.

This results in health systems being unaware of the need for action and failing to implement secondary prevention services that reduce refracture rates, improve the quality of life of those who sustain fragility fractures and reduce the mortality that is directly attributable to any fragility fracture, not just hip fractures [7].

It has been estimated that about 20% of people sustaining a fragility fracture gain access to secondary prevention care despite the evidence internationally that reveals

that ‘Fracture Liaison Services’, a systematic approach to secondary prevention, result in fewer refractures and significant cost savings [28].

3.3.1 Fracture Prevention Services and Guidelines

The International Osteoporosis Foundation (IOF) has developed ‘Capture the Fracture’, a best practice framework that defines essential elements of service delivery and evaluation of Fracture Liaison Services (FLS) [28]. The aim of these services is to have processes in place that ensure each person who sustains a fragility fracture of any part of the skeleton:

- Is identified as requiring organised care that aims to prevent the next fracture
- Understands the need to improve their bone health and how this is achieved through their efforts in tandem with their health-care team
- Has access to investigation of their bone health and understands precipitating factors that may make them susceptible to osteoporosis and further fractures
- Has local access to required medical and other care such as falls prevention services and exercise programmes
- Their health teams in primary and secondary care collaborate to ensure person-/family-centred care working in tandem
- Is followed-up regularly long-term to support adherence to treatment with periodical medical review to ensure their treatment remains appropriate for them.

The FLS must be delivered in a multidisciplinary environment with all team members using behaviour change methodologies to support patient-centred care with self-management support as the key intervention.

Services can be based in primary or secondary care settings but must include a coordinator-based system led by what is internationally referred to as the Fracture Liaison Coordinator [39]. The Fracture Liaison Coordinator, commonly a senior nurse or physiotherapist, provides support and understanding of the needs of those sustaining fragility fractures, helping them understand the need for assessment and ongoing treatment. The coordinator works closely with a medical practitioner who undertakes medical assessment and prescribes treatment. The medical practitioner can also be from a range of medical specialities including, but not limited to; orthopaedic surgery and medicine, primary care and specialist physicians, rheumatology, endocrinology, geriatrics, rehabilitation and pain medicine. In some areas, nurse practitioners work within a designated scope of practice in tandem with medical officers to undertake some of the medical assessment and prescribing of treatment regimens.

The team approach to care of people receiving care within an FLS ensures best practice care is provided and facilitates collaboration between primary care providers such as physicians, falls prevention and radiology services and secondary care providers such as orthopaedic and emergency care teams. This approach ensures a supportive environment for the person who has had a fragility fracture

and allows seamless care and continuity of education about bone health and co-morbidities.

Responsibilities of the Fracture Liaison Coordinator include:

- Being the link between people who access the service and the multidisciplinary team and health service in the hospital, but particularly in the community and especially primary care physicians, as well as facilitating and agreeing formal communication processes
- Coordinating a steering group to guide the service development over time
- Creating and maintaining records of assessment, treatment and outcomes with cooperation of the multidisciplinary team members
- Leading the development, implementation and evaluation of quality improvement projects to ensure ongoing improvements of the service as required
- Supporting and encouraging team members to extend their knowledge in contemporary fracture prevention through self-study and education.

Outcomes from different models of care vary; the more intensive the model of care, the better the health outcomes; Ganda et al. [9] conducted a review of the various reported models of care and found that the more intensive the model of care, the more cost-effective it was with improved quality of life through refracture prevention (see Table 3.1). This has also been shown by Nakayama et al. [27], who examined a FLS at a hospital where an intensive model of care is used. Comparing that hospital's fragility fracture presentations to those of a hospital where no FLS was in place revealed that there were 40% less hip fracture presentations than at the no service site.

Table 3.1 Common models of Fracture Liaison Service (FLS)

| FLS model type | Interventions provided within the model of care | Outcomes |
|----------------|--|--|
| A | Intensive service with all interventions, the responsibility of the team | Most effective across all care needs for people who sustain a fragility fracture and is cost-effective with the most refractures prevented |
| B | All interventions except treatment initiation—the responsibility of the patient's general practitioner | Not as effective as type A but more effective than health education alone |
| C | Health education only provided with handover to the general practitioner from a physician either through written or phone call communication | Little or no effect on initiation of effective treatment known to reduce the incidence of refracture |
| D | Health education provided. There is no physician contact with the person's general practitioner | No effect on initiation of effective treatment known to reduce the incidence of refracture |

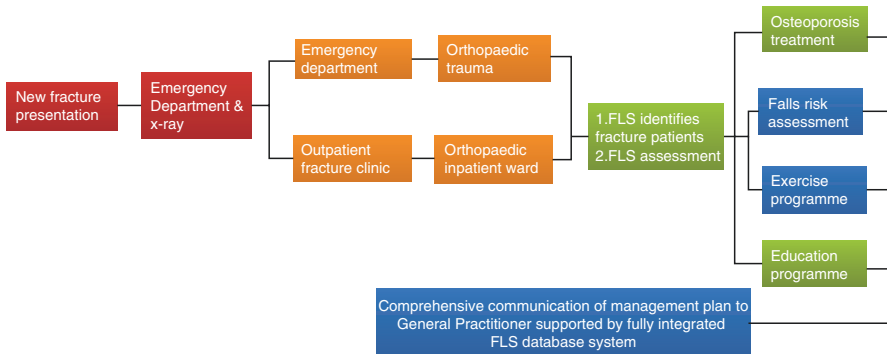


Fig. 3.1 Example of a hospital based fracture Liaison service (UK) <http://capturethefracture.org/fracture-liaison-services>

3.3.2 The Typical Patient Journey

Figure 3.1 provides an example of a pathway of care for people with fragility fracture using a type A model of care.

Identifying people who require the Fracture Liaison Service ('the Service') can be the most time-consuming element as this patient group is often not recorded in medical records as having sustained a 'fragility fracture' but simply a 'fracture'. Therefore, early in the development of a Service, the steering group will need to guide and support the Fracture Liaison Coordinator in the set-up of a system that makes the task less onerous but with the aim of identifying all of those requiring the Service.

International guidelines suggest that all people aged over 50 years who have a fragility fracture (whether identified through presentation with the fracture or found serendipitously through radiology for other reasons) should be assessed [30], so the identification process needs to include the following settings:

- Emergency departments (ED)—whether admitted to a ward or discharged directly from the ED
- Inpatients in all wards/units, including those who fracture while an inpatient
- Those with vertebral fractures identified on radiology reports (incidental or anticipated)
- Those referred from primary care settings but not attended ED or in a ward.

People with vertebral fractures account for about four percent of all fracture presentations and often present 'silently' and diagnosed with back pain, so special attention to finding them is required.

3.3.2.1 First Contact with People Requiring the Fracture Liaison Service

At the first meeting, an explanation of the reasons for referral to the service is required, along with a discussion about the nature of fragility fracture and osteoporosis, investigations that are required and potential results. All initial discussions should be brief, with the aim of helping the person and/or their family know why the Service is required for them. More in-depth discussions can follow later when the patient has had time to absorb the early information.

3.3.2.2 Assessment

A thorough assessment of bone health (Chap. 1) and general health status (Chap. 4) is essential. Assessment involves discussion about the mechanism of the fragility fracture, co-morbidities and the investigations needed as described in Chap. 1. Risk factors for fragility fracture are listed in Box 3.2. The probability of fracture can be estimated using a tool such as the WHO Fracture Risk Assessment Tool (FRAX®) (<https://www.sheffield.ac.uk/FRAX/tool.jsp>) or the Garvan fracture risk calculator (<https://www.garvan.org.au/promotions/bone-fracture-risk/calculator/>). While these tools should be used as a guide only and with clinical expertise on the variables that could affect scores, they can be an opportunity to help people with a fragility fracture to engage with assessment and treatment.

Box 3.2: Risk Factors for Fragility Fracture

| | |
|--|---|
| Age | Parental history of hip fracture |
| Gender | Current glucocorticoid treatment |
| Low body mass index | Current smoking |
| History of falls from a standing height | Alcohol intake of three or more units per day |
| Previous fragility fracture | |
| Secondary causes of osteoporosis: | |
| <ul style="list-style-type: none"> • Rheumatoid arthritis • Type 1 diabetes • Osteogenesis imperfecta in adults • Long-standing untreated hyperthyroidism • Hypogonadism/premature menopause (below 45 years) • Chronic malnutrition • Chronic malabsorption • Chronic liver disease | |

Investigations include:

- Bone density scanning using densitometry (DXA) which has a low radiation dose in comparison to other testing mechanisms, e.g. computed tomography (CT)
- Levels of blood serum of vitamin D, calcium and, e.g. thyroid function tests and others that can suggest aetiology of osteoporosis.

3.3.2.3 Health Education

Health education is a continuing and essential strategy to be used during all interactions with a person who is accessing the Service. The aim is to support the person and their family/carer, at a pace that suits their ability to understand and respond positively. Further aims are the ability to self-manage their health-care needs, to be responsible for conservative interventions and to work effectively with their health-care team to concord with medical therapies and attend check-ups periodically to ensure their treatment remains contemporary and appropriate for them. This is also an opportunity to dispel the myths that abound about osteoporosis treatments with positive truthful explanations.

These conversations, along with formal group education, supporting the person to live well with a chronic condition, require significant skill in positively engaging the person and their family/carer, while recognising they may not be able to assimilate all information in one consultation. It is recommended that health professionals engaging in this work seek training in behaviour change strategies.

3.3.2.4 Establishing a Personal Plan

Following diagnosis, a personalised care plan needs to be set, listing agreed treatment elements and including how the person or team will work to achieve the elements, including access to services required. The person will set some goals for their self-management plan which will be reviewed at agreed timeframes to ensure the person and their health-care team are on track for success in preventing the next fracture.

3.3.2.5 Evaluation

The Fracture Liaison Coordinator is responsible for maintaining records of the progress made by people attending the Service and to share these with the team and the individual. Being able to see progress is very important in motivating them to maintain their treatment and participate in regular review when required.

3.4 Summary of Key Points

- Falls are a key cause of fragility fractures, so preventing them is an essential aspect of preventing fractures
- Holistic person-centred assessment, secondary fracture prevention and assessment and management of falls risk are essential aspects of fragility fracture care and prevention
- Risk factors for falls are individual and complex, and individual screening/assessment is an important first step in falls prevention that can lead to a fall prevention plan
- Environmental adaptations, exercise programmes, vision assessment and interventions, medication review and adjustment, footwear adjustment and foot care are important aspects of falls prevention pathways of care
- Fear of falling is a debilitating consequence of falls that requires sensitive, multidisciplinary care

- A range of system failings make it difficult and time-consuming to identify people with a fragility fracture, so there is a ‘care gap’ that results in many people being left undiagnosed and not treated
- Secondary fracture prevention services, known internationally as Fracture Liaison Services, aim to narrow this gap by evaluating all patients with a fragility fracture, prescribing medical and conservative care treatment that aim to improve bone density and refracture prevention and ensuring follow-up using a holistic, patient-centred multidisciplinary approach.

3.5 Further Study

- Identify the education needs of your team in relation to both falls and secondary fracture prevention and consider how these needs might be fulfilled
- Examples of education resources include:
 - IOF Capture the Fracture best practice framework <http://www.capture-the-fracture.org/node/20>
 - UK NOS Fracture Prevention Practitioner e-learning with test <https://nos.org.uk/for-health-professionals/professional-development/e-learning-and-training/fracture-prevention-practitioner-training/>
 - Local and national training programmes.

3.5.1 Self-Assessment

Assessing your own learning and performance needs to refer to both the falls and Fracture Liaison Service sections:

- Having read this chapter and undertaken further study, the following are some ideas relating to how you might identify what you have learnt and how it relates to your own practice and that of the team you work in
- Discuss the learning you have gained from this chapter and the book so far with your colleagues: identify and discuss how you, as a team, might improve local practice in prevention of falls in your unit and secondary prevention of fractures.

References

1. Ambrose A et al (2015) Falls and fractures: a systematic approach to screening and prevention. *Maturitas* 82:85–93
2. Curtis EM et al (2017) The impact of fragility fracture and approaches to osteoporosis risk assessment worldwide. *Bone* 104:29–38

3. Lippuner K et al (2008) Remaining lifetime and absolute probabilities of osteoporotic fracture in Swiss men and women. *Osteoporos Int* 20(7):1131–1140
4. Chipchase LS et al (2000) Hip fractures in South Australia; into the next century. *ANZ J Surg* 70:117–119
5. Eisman JA et al (2012) Making the first fracture the last fracture: ASBMR Task Force on Secondary Fracture Prevention. *J Bone Miner Res* 27(10):2039–2046
6. Bain H et al (2016) A comprehensive fracture prevention strategy in older adults: The European Union Geriatric Medicine Society (EUGMS) statement. *Aging Clin Exp Res* 28(4):797–803
7. Bliuc D et al (2015) Risk of subsequent fractures and mortality in elderly women and men with fragility fractures with and without osteoporotic bone density: the Dubbo Osteoporosis Epidemiology Study. *J Bone Miner Res* 30(4):637–646
8. Svedborn A et al (2014) Epidemiology and economic burden of osteoporosis in Switzerland. *Arch Osteoporosis*. 9: 187. *Osteoporos Int* 22(7):2051–2065
9. Ganda K et al (2013) Models of care for the secondary prevention of osteoporotic fractures: a systematic review and meta-analysis. *Osteoporos Int* 24(2):393–406
10. Lord SR et al (2007) Falls in older people: risk factors and strategies for prevention. Cambridge University Press, Cambridge
11. Ambrose AF et al (2013) Risk factors for fall among older adults: a review of the literature. *Maturitas* 75:51061
12. NICE (2013) Falls in older people: assessing risk and prevention. CG161. National Institute for Health and Care Excellence
13. Edwards N Lockett D (2008) Development and validation of a modified falls-efficacy scale. *Disabil Rehabil Assist Technol* 3(4):193–200
14. Podsiadlo D, Richardson S (1991) The timed “Up and Go” Test a Test of Basic Functional Mobility for Frail Elderly Persons. *J Am Geriatr Soc* 39:142–148
15. Hoffheinz M, Mibs MPH (2016) The prognostic validity of the timed up and go test with a dual tasks for predicting the risk of falls in the elderly. *Gerontol Geriatr Med* 2:1–5
16. Tinetti M et al (1990) Falls Efficacy as a Measure of Fear or Falling. *J Gerontol* 45:239
17. Tinetti ME et al (1986) Fall Risk Index for elderly patients based on number of chronic disabilities. *Am J Med* 80:429–434
18. Stevens J et al (2014) Circumstances and outcomes of falls among high risk community-dwelling older adults. *Injury Epidemiol* 1:5
19. Gillespie LD et al (2012) Interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev* 2012;(9):CD007146
20. Kendrick D et al (2014) Exercise for reducing fear of falling in older people living in the community. *Cochrane Database Syst Rev* 11:CD009848
21. Karlsson MK et al (2013) Prevention of falls in the elderly—a review. *Osteoporos Int* 24(3):747–762
22. Reed-Jones R et al (2013) Vision and falls: a multidisciplinary review of the contributions of visual impairment to falls among older adults. *Maturitas* 75:22–28
23. Huang AR et al (2013) Medication-related falls in the elderly. Causative factors and preventive strategies. *Drugs Aging* 29(5):359–376
24. Spink MJ et al (2011) Effectiveness of a multifaceted podiatry intervention to prevent falls in community dwelling older people with disabling foot pain: randomized controlled trial. *BMJ* 342:d3411
25. Kelsey JL et al (2010) Footwear and falls in the home among older individuals in the MOBILIZE Boston study. *Footwear Sci* 2(3):123–129
26. Parry S (2013) How should we manage fear of falling on older adults living the community? *BMJ* 346:f2933
27. Nakayama A et al (2016) Evidence of effectiveness of a fracture liaison service to reduce the re-fracture rate. *Osteoporos Int* 27(3):873–879

28. Akesson K et al (2013) Capture the fracture: a Best Practice Framework and global campaign to break the fragility fracture cycle. *Osteoporos Int* 24:2135–2152
29. Marsh D et al (2011) Coordinator-based systems for secondary prevention of fragility fractures. *Osteoporos Int* 22:2051–2065
30. NOS (National Osteoporosis Society) (2016) Competency framework for fracture prevention practitioners <https://nos.org.uk/for-health-professionals/tools-resources/>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

