



FFN

Clinical Toolkit



Acknowledgements

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The Fragility Fracture Network (FFN) is a global organisation, which was founded in order to create a multidisciplinary network of experts for improving treatment and secondary prevention of fragility fractures. During FFN's first decade, from 2010 to 2019, the organisation grew from a small group of healthcare professionals deeply committed to improving outcomes for people who sustain painful, debilitating and, all too often, life-threatening injuries, into a worldwide, multidisciplinary movement.

In 2016, FFN began a collaboration with colleagues from the European Geriatric Medicine Society, European Federation of National Associations of Orthopaedics and Traumatology, International Collaboration of Orthopaedic Nursing, International Geriatric Fracture Society and International Osteoporosis Foundation. In 2018, this resulted in publication of the Global Call to Action on Fragility Fractures (CtA).¹ The CtA has attracted widespread endorsement from organisations whose members are involved on a day-to-day basis in managing people who sustain fragility fractures, and epitomises the multi-professional, multidisciplinary, collaborative ethos of the FFN.

FFN has dedicated itself to turn the Call to Action into *Actual* Action. This Clinical Toolkit and a contemporaneously published Policy Toolkit are intended to provide healthcare professionals throughout the world with tools and strategies to improve the quality of care received by the countless millions of individuals who sustain fragility fractures every year.

The beginning of FFN's second decade has been marked by the greatest healthcare crisis in a century. It should also be noted that 2020 heralds a point of inflection in the ageing of the global population. Humankind is en route to a new demographic era, with a step change in age profiles projected throughout the world. This necessitates a fundamental change in the way that we manage and rehabilitate people who sustain fragility fractures, and prevent them from suffering further fractures in the future.

We hope that the FFN Clinical Toolkit and Policy Toolkit will support you to improve outcomes for the older people in the communities that you serve.



Jay Magaziner
President, FFN



Hannah Seymour
President-Elect, FFN



Matt Costa
Immediate Past
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In 2018, the Global Call to Action on Fragility Fractures (CtA)¹ called for urgent improvement in three so-called clinical pillars:

- **Pillar I – acute care:** Acute multidisciplinary care for the person who suffers a hip, clinical vertebral and other major fragility fracture
- **Pillar II – rehabilitation:** Ongoing post-acute care of people whose ability to function is impaired by hip and major fragility fractures
- **Pillar III – secondary prevention:** Rapid secondary prevention after first occurrence of all fragility fractures, including those in younger people as well as those in older persons, to prevent future fractures.

The fourth pillar of the CtA was political in nature:

- **Pillar IV – alliances:** Assembly of multidisciplinary national alliances to advocate policy change that supports implementation of clinical pillars I–III.

An unprecedented level of endorsement was achieved for implementation of the recommendations made in the CtA from organisations operating at the global, regional and national levels. The specialties represented by these organisations included geriatric medicine, orthopaedics, osteoporosis and bone metabolism, nursing, rehabilitation and rheumatology, along with several multidisciplinary organisations.

The purpose of this Clinical Toolkit is to support colleagues throughout the world to deliver the three clinical pillars of the CtA. A separate [Policy Toolkit](#) has been published contemporaneously to support colleagues to advocate for the policy changes that are needed to bring about widespread uptake of best clinical practice.

The provision of acute care, rehabilitation and secondary fracture prevention varies considerably throughout the world and within countries.

Accordingly, for each clinical pillar, a stepwise approach to implementation is proposed. This includes highly practical suggestions for those colleagues who are at the beginning of their quality improvement journey, those who have developed a pilot programme and are seeking to expand its scope, through to those with programmes that have been operating for several years and need to secure long-term financial sustainability. This approach will avoid overwhelming colleagues who are at the beginning of their quality improvement journey, particularly those working in medium- and low-resource settings.

The sections of the Clinical Toolkit devoted to each of the three pillars have a common structure:

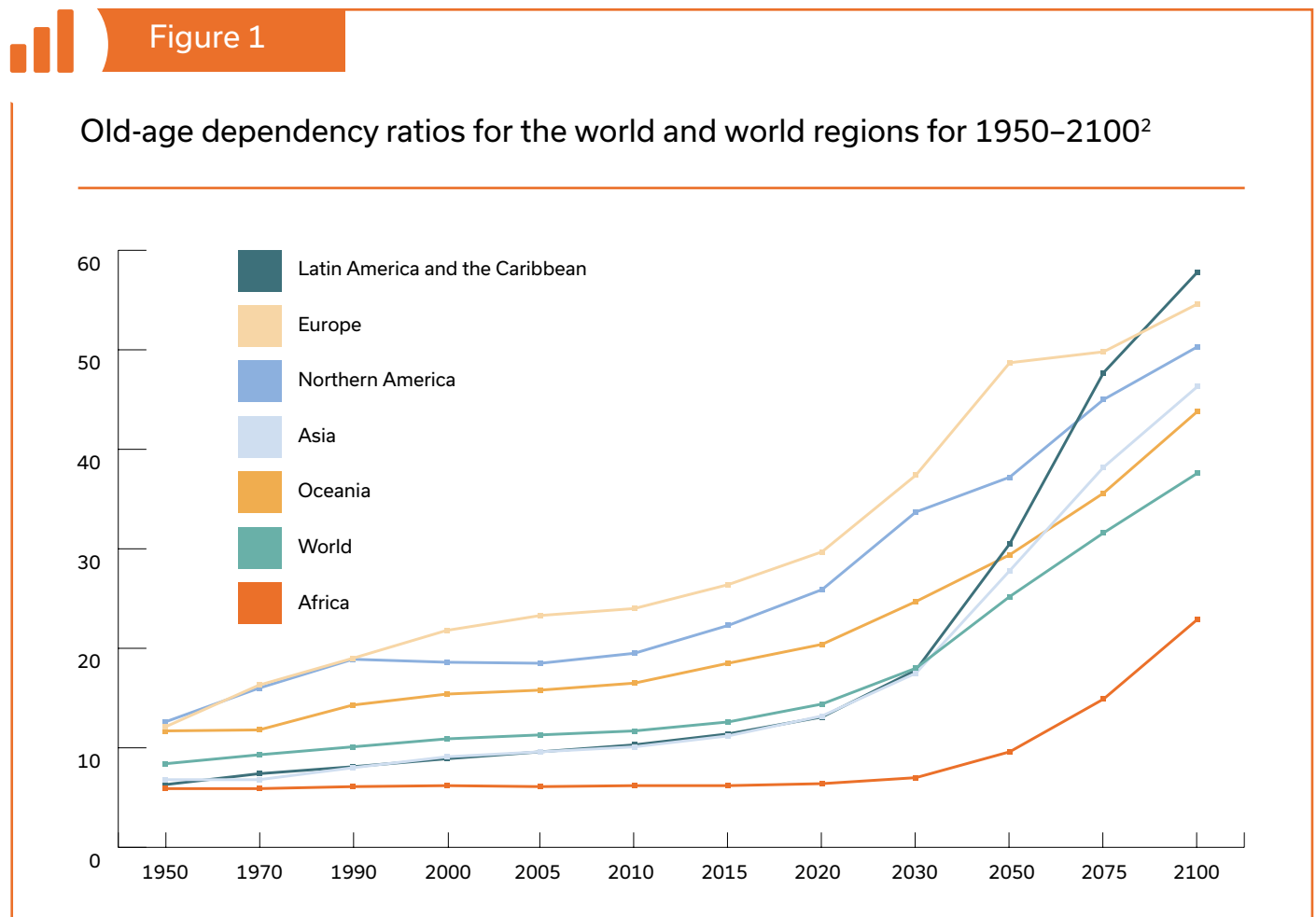
- A summary on clinical and cost-effectiveness
- The organisation of models of care
- Mapping current pathways of care
- A stepwise approach to implementation
- Benchmarking care with clinical guidelines, standards and registries
- Patient-reported outcome measures
- Resources to support implementation
- Resources to engage and inform individuals about aspects of their care.

Links are also provided to COVID-19 resource centres developed by leading professional organisations.

A new demographic era

During the 21st century, profound changes in the demography of the human population will occur in all regions of the world. The pace and extent of these changes can be illustrated by the age dependency ratios described in the United Nations population projections.² The so-called “old-age” dependency ratio is the ratio of the population aged 65 years or over to the population aged 15–64 years, who are considered to be of working age. These ratios are presented as the number of dependents per 100 people of working age. As shown in Figure 1, 2020 marks a point of inflection in the ageing of the world’s population. While some variation in the rate of ageing between regions is evident, the trends are ubiquitous.

A direct consequence of these demographic shifts will be a significant increase in the number of older people who are living with chronic diseases. To paraphrase Ebeling,³ “Osteoporosis, falls and the fragility fractures that follow will be at the vanguard of this battle which is set to rage between quantity and quality of life.”



From *World Population Prospects: Volume II: Demographic Profiles 2017 Revision*. ST/ESA/SER.A/400, by Department of Economic and Social Affairs, Population Division, ©2017 United Nations. Reprinted with the permission of the United Nations.

Global Call to Action on Fragility Fractures

An “All of Society” response is required to mitigate the impact of the ageing population on national health systems and economies. Delivering optimal care for people who sustain fragility fractures is a key component of efforts to maintain the mobility and independence of our older people. To this end, in September 2016, the Fragility Fracture Network (FFN) convened a “Presidents’ Roundtable” during the 5th FFN Global Congress, held in Rome. The purpose of the roundtable was to explore how organisations with a focus on various aspects of care of fragility fractures could collaborate. The organisations involved were FFN, European Geriatric Medicine Society (EuGMS), European Federation of National Associations of Orthopaedics and Traumatology (EFORT), International Collaboration of Orthopaedic Nursing (ICON), International Geriatric Fracture Society (IGFS) and International Osteoporosis Foundation (IOF). It was agreed that despite enormous efforts of the individual organisations in the previous decade, insufficient progress had been made and that a global multidisciplinary and multi-professional collaboration was required. The product of that collaboration was the Global Call to Action on Fragility Fractures (CtA), published in 2018.¹ The CtA called for urgent improvement in four pillars (see [Box 1](#)).

The CtA recommended implementation of specific models of care to deliver the care advocated in the first three (clinical) pillars: orthogeriatric services (OGS), multidisciplinary rehabilitation teams (MRTs) and fracture liaison services (FLS) working seamlessly and collaboratively. The roles of specific constituencies were clearly articulated, including patients and patient advocacy organisations, individual health workers, healthcare professional societies, governmental organisations, private and public insurers, health systems and medical practices, and the global biomedical industry.



Box 1

The four pillars of fragility fracture care, as set out in the FFN Global Call to Action

I

Acute multidisciplinary care for the person who suffers a hip, clinical vertebral and other major fragility fracture.

III

Rapid secondary prevention after first occurrence of all fragility fractures, including those in younger people as well as those in older persons, to prevent future fractures.

II

Rehabilitation and ongoing post-acute care of people whose ability to function is impaired by hip and other major fragility fractures.

IV

Formation of national alliances between relevant professional associations to persuade politicians and promote best practice among colleagues.



*Click here to read the
FFN Global Call to Action*

Arguably, the most significant feature of the CtA was the unprecedented level of endorsement achieved for implementation of its recommendations. On publication, 81 organisations endorsed the CtA. These included organisations operating at the global level, regional level (i.e. Africa, Asia-Pacific, Europe, Latin America and Middle East) and national level for five highly populous countries (Brazil, China, India, Japan and the United States of America). The specialties represented by these organisations included geriatric medicine, orthopaedics, osteoporosis and bone metabolism, nursing, rehabilitation and rheumatology, along with several multidisciplinary organisations. At the time of writing of this Clinical Toolkit, the number of organisations that had endorsed the CtA exceeded 130 and continues to increase. In addition to the published version of the CtA which appeared in the journal *Injury*, the core text of the CtA is available in 12 languages from the [FFN website](#).

Purpose and scope of the Clinical Toolkit

This Clinical Toolkit is intended to support colleagues throughout the world to deliver the three clinical pillars of the CtA. The intended readership includes:

- members of the global FFN and national FFNs
- leaders and members of existing national alliances that focus on fragility fracture care, rehabilitation and/or secondary prevention of falls and fractures
- members of FFN sister organisations that focus specifically on geriatric medicine, orthopaedics, osteoporosis and bone metabolism, nursing, rehabilitation and rheumatology
- individual clinicians who are championing the case for improved fragility fracture care in their institutions.

A separate Policy Toolkit has been published contemporaneously and is available from the FFN website. The Policy Toolkit provides guidance and support for colleagues seeking to engage with policymakers to bring about changes to policy that will enable implementation of the recommendations made in the CtA in their own countries.

The Clinical and Policy Toolkits are presented in two formats: as individual PDFs and also as pages on the global [FFN website](#).



*Click here to download
the FFN Policy Toolkit*

A stepwise approach to implementation of the CtA

The provision of acute care, rehabilitation and secondary fracture prevention varies considerably throughout the world and within countries. A pragmatic approach to implementation could consider that multidisciplinary teams in an institution are broadly at one of three stages of development:

1. **Preparatory:** the multidisciplinary team is keen to design an initial quality improvement initiative, within existing budgets and human resource.
2. **Expansion:** the multidisciplinary team has operated a pilot programme and needs to make a business case to consolidate service improvement and secure mid-term funding.
3. **Sustainability:** the multidisciplinary team has established an effective programme which needs to demonstrate its ongoing value to administrators and payers to secure long-term financial sustainability.

For each clinical pillar, recommendations are made for teams that are at all three stages of development. Obviously, the composition of the multidisciplinary team will be determined locally, and work streams will be aligned to local clinical priorities. It is likely that several clinicians within the team will take on the role of "champion(s)" for quality improvement efforts that specifically relate to each of the three clinical pillars of acute fracture care, rehabilitation and secondary fracture prevention. Further, it is important to ensure that recipients of care have a voice within the project team by including representatives of patients and carers.

A suite of complementary resources

During recent years, FFN has invested significant time and resources in the development of a suite of resources which are complementary in nature. These include:

Textbooks:

- **Orthogeriatrics: The Management of Older Patients with Fragility Fractures:** In 2020, a second edition of the [textbook on orthogeriatric care](#) was published as an Open Access resource.⁴ This textbook provides a comprehensive commentary on the state of the art in all aspects of orthogeriatric care. Throughout this Clinical Toolkit, reference is made to relevant chapters in the orthogeriatric textbook (see [Box 2](#)).
- **Fragility Fracture Nursing:** In 2018, the first edition of the [textbook on fragility fracture nursing](#) was published.⁵ This textbook was the product of a nurse education project which had twin goals:
 - ▶ To define the knowledge base and skill set that nurses need to be professionally competent to deliver the care that fragility fracture patients need
 - ▶ To assert the appropriateness of the delivery of such care by nurses with a fair degree of autonomy, albeit in the context of protocols that are developed and monitored in collaboration with the relevant medical specialists.



Box 2

Further reading

The four introductory chapters of the orthogeriatric textbook (2nd edition)⁴ are recommended additional reading:

- **Chapter 1:** The multidisciplinary approach to fragility fractures around the world – an overview. Marsh D *et al.*
- **Chapter 2:** Epidemiology of fractures and social costs. Veronese N *et al.*
- **Chapter 3:** Osteoporosis in older patients. Falaschi P *et al.*
- **Chapter 4:** Frailty and sarcopenia. Martin F and Ranhoff AH.

Guide to the formation of national FFNs: In 2019, FFN published the [Guide to formation of national Fragility Fracture Networks](#).⁶ A national FFN will catalyse the creation of the multidisciplinary national alliances referred to in the CtA. To date, 16 national FFNs have been established in the countries indicated below, in addition to several other national alliances:

- **National FFNs:**
 - ▶ **Asia-Pacific:** China, India, Japan, Malaysia, Myanmar, Nepal, the Philippines, South Korea, Sri Lanka and Thailand
 - ▶ **Europe:** Greece, Italy, Norway and UK
 - ▶ **Middle East:** Lebanon
 - ▶ **Latin America:** Brazil
- **Other national alliances:**
 - ▶ **Australia:** SOS Fracture Alliance
 - ▶ **New Zealand:** Live Stronger for Longer alliance
 - ▶ **Spain:** Sociedad Espanola de Fracturas Osteoporoticas (SEFRAOS)
 - ▶ **USA:** Fragility Fracture Alliance

The guide provides activists with a roadmap to establish a national FFN and proposes the types of projects that a national FFN could undertake. This Clinical Toolkit provides leaders of established and formative national FFNs, in addition to the other audiences outlined previously, with granular detail on translating the Call to Action into *Actual* Action.

The Fragility Fracture Network and the International Osteoporosis Foundation

As globally active organisations in the musculoskeletal field, FFN and IOF have complementary visions and missions dedicated to reducing the fragility fracture burden for the benefit of patients and healthcare systems worldwide. In March 2020, FFN and IOF signed a Memorandum of Understanding (MOU) which sets the framework for greater collaboration, joint opportunities, and optimisation of resources in areas such as advocacy, education, healthcare professional outreach, conferences and workshops and research, as well as mutual endorsement of flagship operations.

In this regard, FFN has invited IOF to collaborate closely on the development of the Clinical Toolkit and Policy Toolkit initiative, with a particular focus on secondary fracture prevention. In tandem, IOF has invited input from FFN to the new IOF Capture the Fracture® partnership initiative,⁷ which aims to accelerate implementation of FLS globally during the first half of the 2020s.

The Fragility Fracture Network committees

In addition to the FFN Executive Committee, which is a sub-group of the FFN Board, the four committees described below are the “engine room” of FFN activities.

Scientific Committee

The Scientific Committee is responsible for the delivery of FFN’s annual scientific meeting. It is a multi-professional committee, reflecting the aims and objectives of FFN and its global CtA.¹ The meeting is structured to ensure that it is relevant to a range of professions and disciplines and includes sessions for all the pillars identified in the CtA. Within the umbrella of the Scientific Committee sit a range of special interest groups, again with a focus on components of the CtA. These include: Hip Fracture Audit, Hip Fracture Recovery Research, Perioperative Care, Physiotherapy, Vertebral Fragility Fracture and Secondary Fracture Prevention.

Regionalisation Committee

The Regionalisation Committee is focused on stimulating the formation of national FFNs (or analogous multidisciplinary organisations at national level), with the mission to implement the four pillars of the CtA.¹ This is because the necessary changes in healthcare policy can only be enacted at national level, within a given national healthcare system. It is also easier to deliver multidisciplinary, multi-professional education at national level, enabling the workforce development that is needed to deliver the care that the three clinical pillars recommend. The Regionalisation Committee produced the [Guide to Formation of National FFNs](#) and organises Regional Expert Meetings aimed at the activists and thought leaders in a given region.

Education Committee

The purpose of the Education Committee is to provide strategic direction to the education and learning required to achieve FFN’s aims and objectives. Education is central, for example, to reach one of the most important FFN goals: to spread globally the best multidisciplinary practice and systems of care for managing fragility fractures.

The success of the CtA¹ is partially, but significantly, dependent on educating all healthcare professionals and policymakers who can influence the prevention of fragility fractures and the care and management of patients following fragility fractures, along with users of services, their families and carers, and the general public. Of course, in order to reach all these aims, education should be targeted and connected to the different needs of the diverse audiences.

Communications Committee

The purpose of the Communications Committee is to develop policy concerning communication strategies of the FFN and resources to fulfil the strategic approach that are in line with the underlying principles of the FFN. Operations of the committee include website development, social media, newsletters and leading the effort to secure widespread endorsement of the CtA.¹

Clinical Pillar I:

Multidisciplinary co-management of the acute fracture episode



Box 3

Further reading

The nine chapters of the orthogeriatric textbook (2nd edition)⁴ which focus on aspects of acute fracture care are recommended additional reading:

- **Chapter 5:** Establishing an Orthogeriatric service. Sahota O and Ong T.
- **Chapter 6:** Pre-hospital care and the Emergency Department. Williams J *et al.*
- **Chapter 7:** Pre-operative medical assessment and optimisation. Wilson H and Mayor A.
- **Chapter 8:** Orthogeriatric anaesthesia. White S.
- **Chapter 9:** Hip fracture: The choice of surgery. Palm H.
- **Chapter 10:** Proximal Humeral Fractures: The Choice of Treatment. Brorsan S and Palm H.
- **Chapter 11:** Post-operative management. Pioli *et al.*
- **Chapter 12:** Rehabilitation following hip fracture. Dyer S *et al.*
- **Chapter 19:** Fragility Fracture Audit. Ojeda-Thies C *et al.*

Clinical and cost-effectiveness of the orthogeriatric approach

As noted in [Chapter 1](#) of the orthogeriatrics textbook (2nd edition),⁴ there were almost 3,500 publications with the keyword “orthogeriatrics” cited in Google Scholar during the decade 2010–2019. A fracture requires that two conditions occur simultaneously: weak bones and a fall or stress on weak bones. Individuals who present with fragility fractures, especially older patients with hip and/or vertebral fractures, are suffering from two separate issues:

- **A fragility fracture**, primarily due to osteoporosis or osteopenia, which has allowed the fracture to occur with minimal trauma
- **Underlying frailty** of their whole body, which weakens their capacity to respond to stress and is associated with comorbidities.

Accordingly, a co-management approach is required to address both issues, whereby orthopaedic surgeons treat the fragility fracture and geriatricians manage the underlying frailty. In countries where the specialty of geriatric medicine is not well established, other medical disciplines can acquire core competencies to manage frailty.

In 2014, Grigoryan *et al.* published a systematic review and meta-analysis on outcomes in hip fracture patients managed by three different models of care:⁸

- **Model 1:** routine geriatric consultation – care is delivered on an orthopaedic ward where the geriatrician acts as a consultant.
- **Model 2:** geriatric ward – care is delivered on a geriatric ward where the orthopaedic surgeon acts as a consultant.
- **Model 3:** shared care – an integrated model of care where the orthopaedic surgeon and geriatrician share responsibility for the care of the patient.

The overall meta-analysis (i.e. all three models combined) found that orthogeriatric collaboration was associated with a 40% reduction of in-hospital mortality (relative risk [RR] 0.60; 95% confidence interval [CI] 0.43–0.84) and a 17% reduction in long-term mortality (RR 0.83; 95% CI 0.74–0.94). Further, length of stay was also reduced overall (standardised mean difference [SMD] –0.25; 95% CI –0.44 to –0.05) and was particularly evident for the shared care model (SMD –0.61; 95% CI –0.95 to –0.28).

In the UK, since the launch of the National Hip Fracture Database (NHFD) in 2007 and implementation of the Best Practice Tariff financial incentive in 2010, there has been a major shift to more integrated models of care across the country.⁹ A national survey found that during the period 2010–2013 the number of orthogeriatrician hours per patient increased from 1.5 to 4 hours.¹⁰ This was associated with a relative reduction in mortality of 3.4% (95% CI 0.9% to 5.9%, $p=0.01$) and higher rates of prompt surgery (defined as surgery performed on the day of or day following presentation).

The orthogeriatric approach has been shown to be cost-effective in many countries and regions, including Canada,¹¹ China,¹² Hong Kong SAR,¹³ Ireland,¹⁴ Israel,¹⁵ Japan,¹⁶ Singapore,¹⁷ UK¹⁸ and USA.¹⁹

The clinical and cost-effectiveness of a multidisciplinary co-management programme for hip fracture patients in Beijing

In 2019, investigators from Beijing Jishuitan Hospital described the impact of a multidisciplinary co-management care programme for older hip fracture patients in Beijing, China.²⁰ This initiative was led by an orthopaedic surgeon and a geriatrician, working in collaboration with emergency physicians, anaesthesiologists and physiotherapists. The effect of the co-management programme on a range of process measures was reported for the period May 2015 to May 2017, and compared to pre-intervention rates, which included:

- Surgery within 48 hours of admission: 50% of co-managed patients versus 6.4% of pre-intervention patients (adjusted odds ratio [OR] 14.90; $p < 0.0001$).
- Received geriatrician assessment: 100% of co-managed patients versus 0.3% of pre-intervention group (adjusted OR 664.91; $p < 0.0001$).
- Osteoporosis assessment: 76.4% of co-managed patients versus 19.2% of pre-intervention patients (adjusted OR 13.88; $p < 0.0001$).

In 2020, these investigators evaluated the cost-effectiveness of the co-management programme.¹² The lifetime average costs in US dollars for conventional management – where patients were mainly treated in the orthopaedics department – and the co-management approach were comparable at \$11,975 and \$13,309, respectively.

The organisation of orthogeriatric services

The 2nd edition of the British Orthopaedic Association – British Geriatrics Society (BOA–BGS) “Blue Book” on the care of patients with fragility fracture summarised traditional orthopaedic care and several orthogeriatric models of care (see Figure 2).²¹


 Figure 2

The organisation of traditional orthopaedic care and several orthogeriatric models of care

Traditional orthopaedic care

- Patient admitted to a trauma ward
- Care and rehabilitation mainly managed by the orthopaedic surgeon and team
- Geriatrician input to such wards varies:
 - ▶ Consultative service
 - ▶ Once- or twice-weekly geriatrician rounds
 - ▶ Multidisciplinary ward rounds

Geriatric orthopaedic rehabilitation unit

- Early post-operative transfer to a geriatric rehabilitation unit
- Identification of appropriate patients varies:
 - ▶ By orthopaedic staff
 - ▶ By specialist orthogeriatric liaison nurses/hip fracture nurses
 - ▶ Part of routine geriatrician rounds
- Orthopaedic input to the rehabilitation ward varies:
 - ▶ Weekly surgeon visits at fixed times
 - ▶ Orthopaedic liaison nurse

Orthogeriatric liaison and the hip fracture nurse

- A hip fracture nurse takes responsibility for:
 - ▶ Coordinating initial assessment
 - ▶ Expediting pre-operative work-up
 - ▶ Supervising post-operative care
 - ▶ Rehabilitation
 - ▶ Discharge planning
 - ▶ Secondary prevention
 - ▶ Follow-up
 - ▶ Coordinating audit data collection

Combined orthogeriatric care

- Patient admitted to a specialised orthogeriatric ward under care of both geriatricians and orthopaedic surgeons
- Orthogeriatric medical team will:
 - ▶ Deliver pre-operative assessment
 - ▶ Lead post-operative multidisciplinary care
- Rehabilitation may occur in this setting or in a separate rehabilitation unit

In 2016, [Riemen and Hutchison](#) described the roles of all members of the multidisciplinary team and noted:

“In models where a hip fracture is considered a geriatric problem, with surgery to ‘fix the fracture’ being an essential but overall small aspect of care, the outcomes surpass those where fracture fixation alone is the primary focus. This has long been reflected in clinical guidelines but implementation of this concept into daily practice and culture is an ongoing process.”

The UK National Institute for Health and Care Excellence (NICE) has identified the components of a multidisciplinary hip fracture programme as follows:²²

- Orthogeriatric assessment
- Rapid optimisation of fitness for surgery
- Early identification of individual goals for multidisciplinary rehabilitation to recover mobility and independence, and to facilitate return to pre-fracture residence and long-term wellbeing
- Continued, coordinated, orthogeriatric and multidisciplinary review
- Liaison or integration with related services, particularly mental health, falls prevention, bone health, primary care and social services
- Clinical and service governance responsibility for all stages of the pathway of care and rehabilitation, including those delivered in the community.

In 2017, [Middleton et al.](#) compared outcomes after a hospital changed its hip fracture pathway to a completely integrated service on a dedicated orthogeriatric ward from a standard geriatric consultation service.²³ Despite an increase in case complexity for patients managed by the integrated service, results of the change included:

- a reduction in mean length of stay from 27.5 to 21 days ($p < 0.001$)
- a reduction in mean time to surgery from 41.8 to 27.2 hours ($p < 0.001$)
- a 22% reduction in 30-day mortality (13.2 to 10.3%, $p = 0.04$).

In 2019, [Moyet et al.](#) sought to determine the optimal model of orthogeriatric care to prevent mortality after hip fracture in older patients.²⁴ A systematic review and meta-analysis assigned studies to one of three groups:

- Orthogeriatric ward
- Geriatric advice in orthopaedic ward
- Shared care by orthopaedists and geriatricians.

The authors concluded that hip fracture patients admitted to any sort of orthogeriatric care model had reduced long-term mortality compared to standard care (OR 0.85; 95% CI 0.74–0.97). In a subgroup sensitivity analysis, the mortality benefit was most pronounced for the studies which referred to an “orthogeriatric ward” (OR 0.62; 95% CI 0.48–0.80).

In 2020, a special issue of the International Orthopaedic Trauma Association journal was devoted to hip fractures, summarising global approaches and systems of care, and regional experience in Asia-Pacific, Europe, Latin America, Middle East and Africa, and North America.²⁵

The FFN Perioperative Special Interest Group (SIG) is comprised of clinicians who are committed to sharing best practice in perioperative care with colleagues throughout the world.



If you are interested in joining the FFN Perioperative SIG, [click here](#)

Mapping current pathways of acute fracture care

A clinical pathway is an important tool to enable quality improvement in healthcare through standardisation of care processes. A clinical pathway may also be known as care pathway, integrated care pathway, critical pathway or care map. In 2010, when devising the protocol for a Cochrane review of the impact of clinical pathways in hospitals,²⁶ Kinsman *et al.* developed the following criteria to define what constitutes a clinical pathway:²⁷

1. The intervention was a structured multidisciplinary plan of care
2. The intervention was used to translate guidelines or evidence into local structures
3. The intervention detailed the steps in a course of treatment or care in a plan, pathway, algorithm, guideline, protocol or other "inventory of actions"
4. The intervention had time frames or criteria-based progression
5. The intervention aimed to standardise care for a specific clinical problem, procedure or episode of healthcare in a specific population.

After pilot testing, the investigators decided that if an intervention met the first criterion plus three of the other four criteria then it could be included in the Cochrane systematic review. The Cochrane review concluded that clinical pathways were associated with reduced in-hospital complications and improved documentation without negatively impacting on length of stay and hospital costs.

Numerous examples of hip fracture care clinical pathways are available online and are described in the literature. The resources sections of the Australian and New Zealand Hip Fracture Registry (ANZHFR) and the UK NHFD include examples of clinical pathways shared by hospitals in the three countries. FFN has developed a set of resources to support clinicians to visualise current pathways and consider how redesign could improve quality of care.



Click here to see ANZHFR's Shared Hospital Resources



Click here to see FFN's resources for clinicians



Click here to see the UK NHFD's Resources

A stepwise approach to implementation of Clinical Pillar I of the Global Call to Action

As proposed in the introduction section of this Clinical Toolkit, multidisciplinary teams in an institution are likely to be broadly at one of three stages of development: **preparatory**, **expansion** or **sustainability**. In the context of acute fracture care, a stepwise approach to implementation could be informed by clinical standards for hip fracture care from other countries (please note: the terms "clinical standards", "quality standards" and "key performance indicators" are used interchangeably in the published literature and by organisations with a focus on healthcare quality throughout the world).

Current clinical pathways are likely to be unique to individual hospitals across the world. Once the pathway mapping exercise has been undertaken, an initial benchmarking exercise could be undertaken against a particular set of clinical standards. This approach was adopted by investigators in China,²⁸ Germany,²⁹ Hong Kong SAR³⁰ and India,³¹⁻³² who compared delivery of acute hip fracture care in their hospitals with some or all of the six clinical standards proposed in the BOA-BGS Blue Book on the care of patients with fragility fracture.²¹

This approach could enable the multidisciplinary team to determine a sequential set of priority improvement areas. For example, in hospitals which have time to surgery that is significantly longer than that advocated in the benchmark clinical standard, an initial step could be to focus on reducing time to surgery. A plan to sequentially improve delivery of each of the clinical standards relating to various aspects of acute care could serve to break the quality improvement process into manageable pieces. This approach will avoid overwhelming colleagues who are at the beginning of their quality improvement journey, particularly those working in medium- and low-resource settings.

On account of the heterogeneity of healthcare provision throughout the world, in due course, national standards should be developed for each country, that are cognisant of the structure of the health system and the way in which it is funded.

For the purposes of this Clinical Toolkit, the stepwise approach to acute hip fracture care will be informed by the *Australian and New Zealand Hip Fracture Care Clinical Care Standard* (ANZ Hip Fracture Care Standard) published in 2016.³³ However, colleagues could choose any of the clinical standards described in the next section of the Clinical Toolkit to inform their initial benchmarking exercise. The ANZ Hip Fracture Standard included the following quality statements:

1. A patient presenting to hospital with a suspected hip fracture receives care guided by timely assessment and management of medical conditions, including diagnostic imaging, pain assessment and cognitive assessment.
2. A patient with a hip fracture is assessed for pain at the time of presentation and regularly throughout their hospital stay, and receives pain management including the use of multimodal analgesia, if clinically appropriate.
3. A patient with a hip fracture is offered treatment based on an orthogeriatric model of care as defined in the *Australian and New Zealand Guideline for Hip Fracture Care*.³⁴
4. A patient presenting to hospital with a hip fracture, or sustaining a hip fracture while in hospital, receives surgery within 48 hours, if no clinical contraindication exists and the patient prefers surgery.

5. A patient with a hip fracture is offered mobilisation without restrictions on weight-bearing the day after surgery and at least once a day thereafter, depending on the patient's clinical condition and agreed goals of care.
6. Before a patient with a hip fracture leaves hospital, they are offered a falls and bone health assessment, and a management plan based on this assessment, to reduce the risk of another fracture.
7. Before a patient leaves hospital, the patient and their carer are involved in the development of an individualised care plan that describes the patient's ongoing care and goals of care after they leave hospital. The plan is developed collaboratively with the patient's general practitioner. The plan identifies any changes in medicines, any new medicines, and equipment and contact details for rehabilitation services they may require. It also describes mobilisation activities, wound care and function post-injury. This plan is provided to the patient before discharge and to their general practitioner and other ongoing clinical providers within 48 hours of discharge.

Preparatory: The institution has no system in place to provide standardised multidisciplinary co-management of hip fracture patients in accordance with the principles of orthogeriatric care

Objectives:

- Identify the "orthogeriatric champions" from the departments of orthopaedics and geriatric medicine or internal medicine (the latter in countries where geriatric medicine is not an established medical specialty) who are likely to be the co-leaders of the project team described in the next bullet point.
- Establish an orthogeriatric sub-group of the organisation's multidisciplinary fragility fracture project team with representation from all relevant clinical and administrative functions (noting that all project team members will serve as "champions" of the orthogeriatric approach within their respective departments, be they surgeons, physicians, nurses or allied health professionals).
- To ensure that recipients of care have a voice within the project team, invite representatives of patients and carers.
- Map the current clinical pathway for hip fracture patients from presentation to hospital through to discharge to their subsequent place of residence (see the previous sub-section on pathway mapping).
- Consider benchmarking provision of care against some or all of the seven quality statements made in the ANZ Hip Fracture Care Standard³³ or another clinical standard of your choosing (see next section on benchmarking of care).
- Indicators are provided for each ANZ Hip Fracture Standard quality statement. For example:
 - ▶ Quality statement 1:
 - ▷ 1a: Evidence of local arrangements for the management of patients with hip fracture in the emergency department
 - ▷ 1b: Proportion of patients with a hip fracture who have had their preoperative cognitive status assessed.
 - ▶ Quality statement 4: Proportion of patients with a hip fracture receiving surgery within 48 hours of presentation with the hip fracture.

- Develop a protocol for a short-term local audit to benchmark care of hip fracture patients presenting consecutively to your institution for 1 to 2 months prospectively (of the order 40 to 60 patients) or using routinely collected hospital data to do this retrospectively.
- Review the findings of the short-term audit and prioritise specific aspects of care to be improved as a pilot project.
- As suggested in [Chapter 5](#) of the orthogeriatric textbook (2nd edition) on establishing an orthogeriatric service,⁴ when analysing care gaps, use a strategy such as the “five whys” to establish the root cause of the problem (i.e. ask the question “Why does this care gap exist?” five times)³⁵ or a tool such as SWOT analysis (strengths, weaknesses, opportunities and threats).³⁶
- Informed by the current pathway mapping exercise and the answers to the “five whys” or SWOT analysis, consider how existing resources could be reconfigured to deliver the prioritised aspects of care from the perspective of people, processes and technology.
- Implement the pilot programme for a pre-specified period – which is likely to be three to six months – and document delivery of the prioritised aspects of care.

Expansion: A pilot programme has been operating with minimal new financial and human resources

Objectives:

- The multidisciplinary team reviews the pilot programme to identify strengths and areas for improvement.
- Dependent on the scope of the pilot programme – in terms of the specific aspects of care prioritised for improvement – agree on a stepwise process to improve all aspects of care described within the benchmark clinical care standard during the next 1–2 years.
- Review the clinical pathway in light of quality improvements made during the pilot programme and adopt a philosophy of continuous quality improvement informed by audit of patient-level data.
- Consider what new resources will be required to enable adherence to all aspects of the benchmark clinical care standard, from the perspective of people, processes and technology.
- Develop programme protocols for the broader programme scope.
- Develop a fully costed business case to implement the expanded programme in the mid-term (i.e. 2–3 years), which includes quality standards agreed with the programme funder (a generic business case template is available on the FFN website).
- Embed an iterative “Plan-Do-Study-Act” (PDSA),³⁷ LEAN³⁸ and/or Six Sigma³⁹ quality improvement methodology (or similar) into the programme design, to review performance and identify opportunities for refinement in an ongoing fashion, according to a pre-specified time frame (each cycle should be of the order 6–12 months in duration).
- Produce annual programme reports for funders and all clinical stakeholders.
- Participation in local and, in due course, regional and/or national hip fracture registries would provide a mechanism to demonstrate adherence with relevant quality standards, which would offer reputational advantage to the institution.

- Explore opportunities for networking and mentorship e.g. through the FFN Perioperative Specialist Interest Group, the FFN Hip Fracture Audit Special Interest Group and the International Geriatric Fracture Society (IGFS) Site Visit and Exchange Program.
- Consider opportunities to seek certification of the expanded programme and/or staff members e.g. the IGFS CORE Certified Geriatric Fracture Care Programs and the American Geriatrics Society (AGS) AGS CoCare: Ortho™ programme.

Sustainability: Incorporation of an effective orthogeriatric programme into long-term budgetary planning

Objectives:

- The primary objective of the sustainability stage is to persuade funders to make a permanent investment in the people, processes and technology required to deliver an effective orthogeriatric programme for the institution in the long term.
- A fully costed business case is required to measure the impact of the expanded programme on future hip and other fragility fracture cases resulting in hospital admission, based on:
 - ▶ outcomes for individuals managed by the expanded service during the first 2–3 years of operations, including discharge destination, recovery of pre-fracture function, prevention of secondary fractures, quality of life, and short- and long-term mortality
 - ▶ avoidance of readmissions to the institution in terms of bed days saved
 - ▶ cost savings to the health and care system and which function(s) within the health and care system were the principal beneficiary of those savings.
- Ongoing participation in local, regional and/or national hip fracture registries as a commitment to continuous quality improvement.
- Publication of the performance of the programme in peer-reviewed journals and presentation at regional, national and international conferences provides opportunities to share best practice with other institutions and for the institution to be recognised as a Centre of Excellence in the delivery of orthogeriatric care.

Benchmarking care: clinical guidelines, standards and registries

Clinical guidelines on the acute care of hip fractures have been published in many countries. During the last decade, clinical standards derived from such clinical guidelines have been developed in Australia and New Zealand,³³ Canada,⁴⁰ England and Wales,⁴¹ Ireland,⁴² Scotland⁴³ and Spain.⁴⁴ Hip fracture registries provide a mechanism for hospitals to benchmark provision of care against clinical standards. Registries have been established or are in development in Australia and New Zealand,⁴⁵ Denmark,⁴⁶ Ireland,⁴⁷ Italy,⁴⁸ Mexico,⁴⁹ the Netherlands,⁵⁰ Norway,⁵¹ Scotland,⁵² South Korea,⁵³ Spain,⁵⁴ Sri Lanka,⁵⁵ Sweden⁵⁶ and the UK (England, Wales and Northern Ireland).⁵⁷

The FFN Strategic Focus states that FFN will facilitate national multidisciplinary alliances which lead to:

- consensus guidelines
- quality standards
- systematic performance measurement for the care of older people with fragility fracture.

The metric of FFN's success will be the number of nations in which these goals are achieved. In those countries which do not currently have consensus guidelines or quality standards for hip fracture care, an initial project for a national FFN or other multidisciplinary alliance could be to develop these. The guidelines and standards published to date could inform that process. A sequential process could be followed to achieve this, which would include the following steps:

- Establish a guidelines development group comprised of invited representatives from all relevant professional organisations in your country
- If your country has a governmental healthcare quality organisation, explore whether opportunities exist to engage with this organisation to secure endorsement of the guidelines upon publication
- Draft the consensus guidelines and undertake a consultation exercise to seek feedback from the leadership of the represented professional organisations
- Publish the guidelines having sought endorsement from all the represented professional organisations and the governmental healthcare quality organisation (if present in your country)
- Invite some or all of the members of the guidelines development group to draft quality standards derived from the guidelines
- Publish the quality standards and disseminate to all hospitals in the country
- Agree a minimum common data set (e.g. the [FFN MCD](#))
- Establish a network of hospitals that are "early adopters" of the minimum common data set and quality standards, and are benchmarking the care they provide to hip fracture patients against the quality standards
- Establish a Hip Fracture Registry Steering Committee which will seek funds to develop a registry and employ a registry coordinator
- Develop and launch the registry and a strategy to encourage hospitals nationwide to participate.

The impact of benchmarking hip fracture care: A case study from the UK

In 2007, the UK NHFD⁵⁷ was launched to coincide with publication of the BOA–BGS Blue Book on the care of patients with fragility fracture.²¹ The Blue Book proposed the following six clinical standards:

1. All patients with hip fracture should be admitted to an acute orthopaedic ward within 4 hours of presentation
2. All patients with hip fracture who are medically fit should have surgery within 48 hours of admission, and during normal working hours
3. All patients with hip fracture should be assessed and cared for with a view to minimising their risk of developing a pressure ulcer
4. All patients presenting with a fragility fracture should be managed on an orthopaedic ward with routine access to acute orthogeriatric medical support from the time of admission

5. All patients presenting with fragility fracture should be assessed to determine their need for antiresorptive therapy to prevent future osteoporotic fractures
6. All patients presenting with a fragility fracture following a fall should be offered multidisciplinary assessment and intervention to prevent future falls.

The rationale for the need for consensus clinical standards in combination with a mechanism to benchmark against those standards was described as follows:

“These standards reflect good practice at key stages of hip fracture care.

Widespread compliance with them would improve the quality and outcomes of care and also reduce its costs. The rationale for them is set out in the Blue Book, and compliance – and progress towards compliance – can be continuously monitored by participation in NHFD.”

In 2011, NICE published clinical guidelines on hip fracture care²² and subsequently published a quality standard derived from these guidelines.⁴¹

In 2010, the Department of Health for England introduced the Best Practice Tariff for hip fracture (BPT),⁵⁸ a financial incentive scheme that linked the level of reimbursement to the hospital, at the level of an individual patient, to delivery of key performance indicators based on the Blue Book standards. This was made possible by near universal participation in the NHFD. The payment differential for delivering best practice was initially set at GBP £445 (USD \$570, euro €490) for 2010–2011, which was subsequently increased to GBP £890 (USD \$1,139, euro €979) for 2011–2012 and GBP £1,335 (USD \$1,709, euro €1,469) for 2012–2013 and thereafter. In order to receive the BPT uplift, all of the following criteria needed to be met during 2010–2012:

- Time to surgery within 36 hours from arrival in an emergency department, or time of diagnosis if an inpatient, to the start of anaesthesia
- Involvement of an (ortho-) geriatrician:
 - ▶ Admitted under the joint care of a consultant geriatrician and a consultant orthopaedic surgeon
 - ▶ Admitted using an assessment protocol agreed by geriatric medicine, orthopaedic surgery and anaesthesia
 - ▶ Assessed by a geriatrician (as defined by a consultant, non-consultant career grade (NCCG), or specialist trainee ST3+) in the perioperative period (defined as within 72 hours of admission)
 - ▶ Postoperative geriatrician-directed:
 - ▷ Multi-professional rehabilitation team
 - ▷ Fracture prevention assessments (falls and bone health).

From April 2012, an additional BPT criterion was added which required pre- and post-operative cognitive assessments to be completed. During the period 2012–2020, further refinements were made to the BPT criteria, with the most recent being extension of the scheme to include fractures of the femoral shaft and distal femur.

In 2015, Neuberger *et al.* undertook an evaluation of the impact of the NHFD initiative, consisting of the Blue Book clinical standards, data collection and feedback through the NHFD and NHFD-led educational and workforce development activities to support regional and national sharing of best practice.⁵⁹ Key findings included the following:

- Participation in the NHFD increased from 11 hospitals in 2007 to 175 hospitals in 2011.

- From 2007 to 2011, the rate of early surgery (on day of admission, or day after) increased from 54.5% to 71.3%, whereas the rate had remained stable during the period 2003–2007 (the NHFD was launched in September 2007).
- From 2007–2011, 30-day mortality reduced from 10.9% to 8.5%, compared to a fall from 11.5% to 10.9% from 2003–2007. The annual relative reduction in adjusted 30-day mortality was 1.8% per year in the period prior to launch of the NHFD, compared with 7.6% per year after the launch ($p < 0.001$ for the difference).

In 2019, Metcalfe *et al.* sought to evaluate the impact of the BPT on outcomes for hip fracture patients in England by using Scotland, which did not participate in the scheme, as a control group.⁶⁰ Patients were included in the analysis if they were treated for a hip fracture in England ($n=1,037,860$) or Scotland ($n=116,594$) with inpatient admission dates between January 2000 and December 2016, and had complete follow-up information for one year following admission. The BPT was implemented in England from April 2010. Between 2010 and 2016, 7,600 fewer deaths could be attributed to interventions driven by the BPT. Despite an observed steady increase in readmissions to hospital during the pre-implementation phase, this was reversed on implementation of the BPT. Time to surgery and length of stay were also significantly reduced.

In 2019, a set of key performance indicators was developed to support collaborative improvement efforts.⁶¹ A platform has been created to enable sharing of case studies relating to specific indicators as well as mortality.

At the time of writing of this Clinical Toolkit, the NHFD has documented, benchmarked and enabled improvement of the care of 650,000 consecutive hip fracture patients who have presented to hospitals in England, Wales and Northern Ireland from 2007 to 2020.

The FFN Hip Fracture Audit Special Interest Group (FFN HFA SIG) is comprised of clinicians who are committed to sharing best practice in hip fracture audit with colleagues throughout the world.



*If you are interested in joining the
FFN HFA SIG, click here*

Patient-reported outcomes measures

Patient-reported outcomes measures (PROMs) provide information on aspects of patients' health status relating to quality of life, which can include physical, mental and social health, symptoms of disease and function. PROMs can be generic or condition-specific and provide an important patient perspective on what matters to them in the context of their health, social and psychological wellbeing. They can be used in the clinical context to provide a person-centred approach, as well as to guide improvements in provision of services that will, from the perspective of the patient, provide positive outcomes that improve their quality of life. Currently, there is a lack of condition-specific PROMs that have been validated for fragility fractures.

In 2014, Parsons *et al.* evaluated responsiveness and associations between the Oxford Hip Score (OHS, a hip-specific measure), ICEpop CAPability (ICECAP-O, a measure of capability in older people) and EuroQol EQ-5D (general health-related quality of life measure) in a large cohort of hip fracture patients.⁶²

The authors concluded that EQ-5D could be an outcome measure for patients recovering from hip fracture and correlates strongly with OHS. Notably, EQ-5D was as sensitive to change in outcome as hip-specific outcome measurement tools. Importantly, given that up to 40% of hip fracture patients have cognitive impairment, EQ-5D scores were similarly responsive whether provided by patients without cognitive impairment or proxies of patients with impairment. This work should be repeated for fragility fractures at other skeletal sites.

In 2015, these findings were supported by a qualitative interview study which explored what hip fracture patients considered important when evaluating their recovery.⁶³ This included pre-fracture mobility, adaptations to reduced mobility before or after fracture, and whether or not patients perceived themselves to be declining with age. The authors concluded "...that for the population experiencing fragility hip fractures, it is unlikely that a single PROM specific to hip fracture could be developed which is relevant to the whole spectrum of patients." In 2017, Haywood *et al.* undertook a systematic review⁶⁴ of the quality and acceptability of PROMs for hip fracture patients, and concluded that there were few robust evaluations which could be used to make clear recommendations on PROM selection and that further research is required.

Resources to support implementation

Template

- [Generic Orthogeriatric Service Business Case Template](#) available for download from the FFN website.

Hip fracture registries and toolkits



Australia and New Zealand: ANZ Hip Fracture Registry



Canada: Bone and Joint Canada *National Hip Fracture Toolkit*



Denmark: National Database of Hip Fractures



Ireland: Irish Hip Fracture Database



Italy: Gruppo Italiano di Ortogeriatría 1.0 Database



Japan: Japan National Hip Fracture Database



Mexico: Mexican Hip Fracture Audit (ReMexFC)



The Netherlands: The Dutch Hip Fracture Audit



Norway: The Norwegian Hip Fracture Register



Scotland: The Scottish Hip Fracture Audit



South Korea: The Korean Hip Fracture Register



Spain: Spanish National Hip Fracture Registry



Sweden: National Quality Registry for Hip Fracture Patients and Treatment (RIKSHÖFT)



UK: National Hip Fracture Database



USA:

- American Academy of Orthopaedic Surgeons *Hip Fractures in the Elderly*
- American College of Surgeons National Surgical Quality Improvement Program and article in the *Journal of Orthopaedic Trauma*
- American Geriatrics Society *AGS Co-Care: Ortho™*

Other orthogeriatric resources

The Shared Hospital Resources section of the [ANZ Hip Fracture Registry website](#) and the Resources section of the [UK National Hip Fracture Database website](#) have a broad range of useful resources. Please note that these have not been subject to formal clinical review by FFN. In addition, the following systematic reviews relating to specific clinical issues may be of interest to readers of this Toolkit:

- Anti-coagulants: 2016 Cochrane Database⁶⁵ and 2020 by Carrier *et al.*⁶⁶
- Cardiac disease: 2020 by Low and Lightfoot.⁶⁷
- Delirium: 2020 Cochrane Database⁶⁸ and 2018 by Oberai *et al.*⁶⁹
- Blood transfusion: 2015 Cochrane Database⁷⁰ and 2019 by Liu *et al.*⁷¹

The AO Trauma Orthogeriatrics App can be downloaded for free from the [iTunes App Store](#) or the [Google Play Store](#).

Orthogeriatrics textbook (2nd edition): cross-cutting issues

In addition to Chapters 5–12 and 19, which focus on aspects of acute fracture care, the following chapters on cross-cutting issues are also relevant:

- [Chapter 17:](#) Nursing in the Orthogeriatric Setting. Santy-Tomlinson J *et al.*
- [Chapter 18:](#) Nutritional Care of the Older Patient with Fragility Fracture. Bell J *et al.*

Resources to engage and inform individuals about acute fracture care



Australia and New Zealand: ANZHFR "My Hip Fracture Guide". Available in the following languages:

- Arabic
- Chinese (simplified)
- Chinese (traditional)
- Dari
- English
- Farsi
- Greek
- Hindi
- Italian
- Korean
- Nepali
- Punjabi
- Spanish
- Tagalog
- Vietnamese

Australian Commission on Safety and Quality in Health Care and Health Quality and Safety Commission New Zealand "Consumer Fact Sheet"



Canada: Canadian Orthopaedic Foundation "Recovery from a hip fracture: Information for patients and care givers"



UK: NHFD "Your hip fracture: all about your hip fracture and what to expect on the road to recovery"



USA: OrthoInfo (from the American Academy of Orthopaedic Surgeons) "Hip fractures"

Clinical Pillar II:

Optimising rehabilitation to recover function, independence and quality of life



Box 4

Further reading

The four chapters of the orthogeriatric textbook (2nd edition)⁴ which focus on aspects of rehabilitation are recommended additional reading:

- **Chapter 12:** Rehabilitation following hip fracture. Dyer S *et al.*
- **Chapter 13:** The psychological health of patients and their caregivers. Eleuteri S *et al.*
- **Chapter 17:** Nursing in the Orthogeriatric Setting. Santy-Tomlinson J *et al.*
- **Chapter 18:** Nutritional Care of the Older Patient with Fragility Fracture. Bell J *et al.*

Clinical and cost-effectiveness of the multidisciplinary approach to rehabilitation

In 2016, the FFN Hip Fracture Recovery Research Special Interest Group reviewed long-term disability outcomes following hip fracture.⁷² Key findings included the following:

- Pre-fracture level of mobility and ability to perform instrumental activities of daily living was recovered by 40–60% of study participants
- 20–60% of people who could independently perform self-care activities (such as washing and dressing) prior to their hip fracture required assistance with such tasks up to two years post-fracture
- 10–20% of people who sustain a hip fracture in Western nations are moved to a care facility as a result of their fracture.

The authors concluded that outcomes are poor for a significant proportion of people who sustain hip fractures and that investment in research is required to develop programmes to improve long-term recovery of function.

Several aspects of rehabilitation for people who sustain fragility fractures have been the subject of meta-analyses in recent years. In 2018, Nordström *et al.* evaluated the effects of geriatric interdisciplinary teams (GITs) on outcomes for hip fracture patients.⁷³ Compared with conventional care, GITs were associated with increased activities of daily living/physical function (SMD 0.32; 95% CI 0.17–0.47) and mobility (SMD 0.32; 95% CI 0.12–0.52). However, the likelihood of living in one's own home after discharge was the same for both groups. In 2019, Lim *et al.* evaluated the effect of balance training after hip fracture surgery.⁷⁴ Compared to the usual care group, the balance training group demonstrated:

- improved overall physical functioning (overall SMD 0.39; 95% CI 0.11–0.67; $p=0.006$)
- improved balance (pooled SMD 0.57; 95% CI 0.15–0.99; $p=0.008$) and gait (SMD 0.20; 95% CI 0.04–0.35; $p=0.012$)
- improved lower limb strength (SMD 0.28; 95% CI 0.12–0.43; $p<0.001$) and performance task scores (SMD 0.66; 95% CI 0.13–1.19; $p=0.015$)
- improved activities of daily living (SMD 0.48; 95% CI 0.04–0.93; $p=0.032$) and health-related quality of life scores (SMD 0.60; 95% CI 0.02–1.18; $p=0.042$).

The authors concluded that balance training should be specifically included in postoperative rehabilitation programmes. In 2019, Lim *et al.* also evaluated the effectiveness of occupational therapy to improve patient outcomes after hip fracture surgery.⁷⁵ A non-significant trend towards improvement in physical function, activities of daily living and falls incidence was observed. However, significant improvements were observed in health perception and patient emotions.

In 2016, Diong *et al.* evaluated the efficacy of structured exercise on mobility after hip fracture in a meta-regression analysis.⁷⁶ Greater treatment effects were evident in trials that included progressive resistance exercise (change in SMD 0.58; 95% CI 0.17–0.98; $p=0.008$, adjusted R^2 60%) and delivered interventions in settings other than hospital alone (change in SMD 0.50; 95% CI 0.08–0.93; $p=0.024$; adjusted R^2 49%).

In 2020, Tan *et al.* evaluated the efficacy of home-based exercise programmes on physical function after hip fracture in a meta-analysis.⁷⁷ The home-based programmes were associated with significant positive effects on leg strength in both the fractured and non-fractured legs, and were also seen in increased times for the intervention group in their the six-minute walk tests. The EVA-Hip randomised controlled trial has evaluated the clinical and cost-effectiveness of a home-based exercise programme delivered four months after hip fracture surgery.⁷⁸ Community-dwelling individuals aged 70 years or older were recruited to the study, which excluded those who were unable to walk 10 metres prior to fracturing their hip. All participants underwent routine treatment and rehabilitation. The intervention group received 20 additional sessions over 10 weeks of structured home exercise focused on improving gait and balance, which was delivered by physiotherapists in a primary care setting. Outcome measures which favoured the intervention group included an improvement in gait speed comparing that measured four months after surgery and:

- on completion of the 10-week intervention (0.09 m/sec; 95% CI 0.04–0.14; $p < 0.001$)
- at 12 months after surgery (0.07 m/sec; 95% CI 0.02–0.12; $p < 0.009$).

For the period four months post-surgery to 12 months post-surgery, no significant difference was observed for total healthcare costs.

The impact of rehabilitation programmes after hip fracture on mortality has been studied in randomised controlled trials (RCTs). In 2012, Fiatarone Singh *et al.* evaluated the effects of high-intensity progressive resistance training supervised by geriatricians on mortality and nursing home admissions.⁷⁹ The core treatment was initiated six to eight weeks after fracture, whereupon participants were prescribed high-intensity weight-lifting exercise to be undertaken in the outpatient clinic for two days per week for 12 months. Compared to the usual care control group, the risk of death for the intervention group was reduced by 81% (age-adjusted OR 0.19; 95% CI 0.04–0.91) and nursing home admissions by 84% (age-adjusted OR 0.16; 95% CI 0.04–0.64). In 2019, Crotty *et al.* evaluated the impact of a four-week postoperative rehabilitation programme delivered in nursing care facilities.⁸⁰ The intervention began within 24 hours of the patient returning to the facility and included a comprehensive geriatric assessment, physiotherapy, nutritional assessment and a care plan. The intervention involved 13 hours of input. The primary outcomes were mobility as measured by the Nursing Home Life-Space Diameter (NHLSD) and quality of life by the DEMQOL PROM. Key findings included the following:

- At four weeks:
 - ▶ The intervention group had better mobility (NHLSD mean difference -1.9 ; 95% CI -3.3 to -0.57 ; $p = 0.006$)
 - ▶ The death rate was 8% in the intervention group and 18% in the control group (log rank test $p = 0.048$)
- At 12 months the intervention group had better quality of life (DEMQOL sum score mean difference -7.4 ; 95% CI -12.5 to -2.3 ; $p = 0.005$), but there were no other differences between treatment and control groups.

In 2020, Sherrington *et al.* described the impact of a home-based exercise intervention on mobility-related disability and falls after lower limb or pelvic fracture.⁸¹ The intervention involved physiotherapists visiting participants' homes up to 10 times during a 12-month period. Participants undertook 20- to 30-minute sessions of lower limb balance and strengthening exercises at least three times per week for 12 months. While statistically significant differences were not observed for the primary outcome measures, between-group differences were seen for secondary measures, including balance and mobility, fall risk, physical activity and community outings.

Given that the majority of the studies described above relate to hip fracture, it should be noted that evidence relating to rehabilitation of people who have sustained vertebral fragility fractures is lacking.

The organisation of Multidisciplinary Rehabilitation Teams

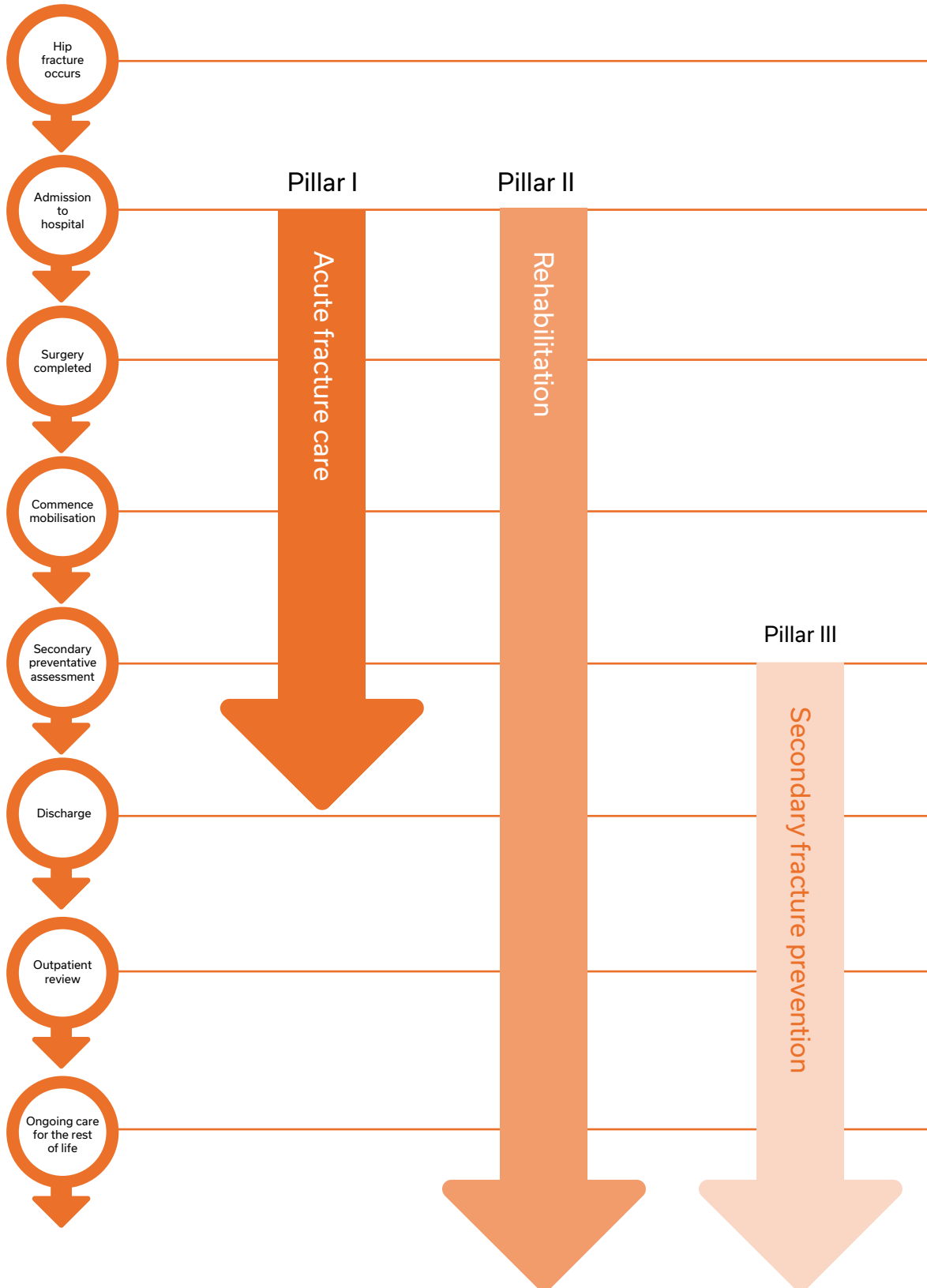
"If acute wards perceive rehabilitation and discharge planning as not being their responsibility, they will accumulate patients who are seen as simply waiting for rehabilitation. These patients will fail to make progress in the crucial early postoperative days, and may be demoralised, confused and deconditioned when the time comes for them to move to other hospital or community rehabilitation settings."

BOA-BGS Blue Book on the care of patients with fragility fracture, 2nd edition²¹

While the FFN Global CtA¹ states that the fracture patient's journey can be viewed as three distinct sequential steps – acute fracture care, rehabilitation and secondary fracture prevention – rehabilitation spans all three clinical pillars (see Figure 3). Indeed, in low-resource settings where time to surgery could be very long, rehabilitation may have to begin prior to surgery e.g. bed exercises may be required to prevent further loss of muscle strength in the non-fractured leg. It is imperative that all members of the multidisciplinary team are involved in rehabilitation from day one and that planning for post-acute care begins when the patient is admitted to hospital.

Figure 3

The temporal relationship of the three Clinical Pillars during acute and long-term care



Throughout the world, there is significant variability in the way that health systems organise acute, sub-acute and post-acute care. Accordingly, when developing rehabilitation services for people who sustain fragility fractures, serious consideration must be given to care transition planning and ensuring that transitions are seamless. Where care transitions occur will become evident in the mapping of current pathways (see next sub-section).

Chapter 12 of the orthogeriatric textbook (2nd edition)⁴ is recommended reading and includes reviews of the evidence base relating to the following aspects of rehabilitation:

- The principles of rehabilitation programmes after hip fracture
- Knowledge on the pattern of recovery following hip fracture
- Factors associated with poor outcomes after hip fracture
- Key elements of a rehabilitation programme and what programmes should be recommended
- Rehabilitation and cognitive impairment
- Psychosocial factors and rehabilitation
- Delivery of rehabilitation following hip fracture in low- and middle-income countries.

As nutrition is an important aspect of the recovery pathway, Chapter 18 on nutrition in the elderly will also be of value to readers of this toolkit. Furthermore, Chapter 11 of the Fragility Fracture Nursing textbook⁵ includes discussion of the importance of family partnerships in the care and recovery of hip fracture patients.

Multidisciplinary rehabilitation teams with representation from nursing, physiotherapy, psychiatry, occupational therapy, nutrition, social work, psychology, pharmacy and medicine should hold regular meetings to consider the following:

- The care plan for patients
- Setting of short- and long-term goals
- Length of stay
- Educational needs of the patient, carers and family members
- Discharge planning.

Progress should be reviewed with patients, and outcomes assessed. This is an ideal time to commence using patient-reported measures (both outcomes and experience) where cognition allows, to ensure the patient voice is documented and listened to in these assessments and further care planning.

In low-resource settings there is often a scarcity of physiotherapists and nurses. In such circumstances, family members and carers could be considered as members of the extended team and should be provided with education to enable them to support the recovery of the person with a fracture.

The textbook on Fragility Fracture Nursing⁵ is also recommended reading in relation to rehabilitation, in particular Chapter 6 on mobility, remobilisation, exercise and prevention of the complications of stasis; Chapter 8 on nutrition and hydration; and Chapter 10 on rehabilitation and discharge.

Annual reports from hip fracture registries in Australia and New Zealand,⁸² Spain⁵⁴ and the UK⁸³ noted that more than one third of hip fracture patients had impaired cognition or known dementia prior to hospital admission. In 2020, Mitchell *et al.*

analysed a large sample of patients ($n=69,370$) who presented with hip fractures to hospitals in New South Wales, Australia during the period 2007–2017⁸⁴.

Among the 27% of these patients who were adults living with dementia, the hospitalisation rate was 2.5 times higher than for those without dementia.

Major differences were evident relating to rehabilitation:

- Patients without dementia were more than twice as likely to receive in-hospital rehabilitation compared to those with dementia (55.9% vs 24.4%; $p<0.0001$)
- Patients without dementia had almost 10 times the proportion of day-only hospital-based rehabilitation after hospital discharge (6.7 vs 0.7; $p<0.0001$).

The authors concluded that consistent criteria were required to determine access to hip fracture rehabilitation and that services specifically designed for people living with dementia are needed. The latter conclusion was echoed in a recent Cochrane systematic review on this subject.⁸⁵ Chapter 12 of the 2nd edition of the orthogeriatrics textbook provides an overview of studies with positive results which specifically targeted people living with dementia.⁴

In 2020, Beaupre *et al.* compared the cost-effectiveness of 10 weeks of outreach rehabilitation for nursing home residents to a usual care control group.⁸⁶

The programme was designed for residents who were ambulatory prior to their fracture. There were no cognitive criteria for inclusion. The programme was delivered by outreach rehabilitation teams comprised of a licensed physiotherapist and two physical therapy assistants. The intervention group received 30 rehabilitation sessions in their nursing home, beginning within 1–3 weeks after hospital discharge. During this period, the usual rehabilitation services that they would receive were discontinued, whereas the control group received usual post-fracture care. Findings included the following:

- EQ-5D scores were higher for the intervention group at three, six and 12 months, although did not reach statistical significance
- The control group experienced double the rate of readmissions as that of the intervention group, resulting in higher hospital costs per patient (\$3,350), which more than offset the cost to deliver the intervention (\$2,300)
- An incremental cost per patient of –\$621 for intervention patients was not statistically significant; however, a sensitivity analysis suggests that the intervention is likely to be cost-saving.

The psychological health of patients and their carers

Chapter 13 of the orthogeriatric textbook (2nd edition)⁴ notes that people who sustain hip fractures are among the most vulnerable of hospitalised patients. Depression, delirium and cognitive impairment are common. It is well established that informal carers play a very important role in the recovery process, and a relationship exists between the burden that carers experience and the psychological wellbeing of the person with the hip fracture. The chapter provides a comprehensive analysis of the psychological aspects of the recovery process from the perspective of both the affected person and the carer, how it should be assessed and how the orthogeriatric team can positively influence outcomes.

Mapping current pathways of care for rehabilitation

In 2018, a national research priority-setting partnership in the UK – which included over 1,000 responses from patients, carers and healthcare professionals – identified the top 10 uncertainties in management of fragility fractures of the lower limb and pelvis. This included the following (in numerical order among the top 10 uncertainties):⁸⁷

1. What is the best physiotherapy and/or occupational therapy regimen for adults during their in-hospital recovery from a fragility fracture of the lower limb?
2. What is the best physiotherapy and/or occupational therapy regimen for adults during out-of-hospital recovery from a fragility fracture of the lower limb?
4. What information about recovery (e.g. rehabilitation, medication, exercise, nutrition, pain), and in what form, should be provided to patients and carers following a fragility fracture of the lower limb?
5. What is the best weight-bearing regimen following treatment (with or without surgery) for fragility fractures of the ankle?
9. What are the key components of a rehabilitation pathway for adults with dementia/cognitive impairment following a fragility fracture of the lower limb?

In 2019, an analogous initiative was undertaken to identify the top 10 research priorities for fragility fractures of the upper limb among people over 50 years of age.⁸⁸ Three of these priorities related, at least in part, to rehabilitation. There would be merit to taking this approach to define research priorities for vertebral fragility fractures.

In 2018, Tedesco *et al.* sought to determine which post-operative rehabilitation pathways after hip fracture were most effective.⁸⁹ Among a study population of 2,208 patients, 24% received intensive hospital rehabilitation, 41% received rehabilitation in private inpatient rehabilitation facilities (IRF) and 35% received no post-acute rehabilitation. Compared to the intensive hospitals rehabilitation group, both the no rehabilitation group (Hazard Ratio (HR) 2.19; 95% CI 1.54–3.12; $p < 0.001$) and the IRF rehabilitation group (HR 1.66; 95% CI 1.54–1.79; $p < 0.001$) had higher rates of mortality at six months after admission. No significant differences in readmission rates were observed between groups.

In 2019, Talevski *et al.* undertook a meta-analysis to evaluate the effect of fragility fracture care pathways on health-related quality of life (HRQoL) and physical function.⁹⁰ Compared to usual care, patients who received care according to clinical pathways had moderate improvements in HRQoL (SMD 0.24; 95% CI 0.12–0.35] and physical function (SMD 0.21; 95% CI 0.10–0.33). Greater improvements in outcomes were observed for:

- inpatient care pathways that extended to the outpatient setting
- care pathways that included a care coordinator, geriatric assessment, rehabilitation, prevention of inpatient complications, nutritional advice or discharge planning.

As noted previously, rehabilitation spans all three clinical pillars of the CtA.¹ Accordingly, the care pathway for rehabilitation should be an integral part of the overall care pathway for fragility fractures, from admission to hospital through to long-term care in the community setting.

FFN has developed a set of resources to support clinicians to visualise current pathways and consider how redesign could improve quality of care.



*Click here to access
these resources*

A stepwise approach to implementation of Clinical Pillar II of the Global Call to Action

As we have established, multidisciplinary teams in an institution are likely to be broadly at one of three stages of development: preparatory, expansion or sustainability. As for acute fracture care, in the context of rehabilitation, a stepwise approach to implementation could be informed by clinical standards for rehabilitation from other countries. Once the pathway mapping exercise has been undertaken, an initial benchmarking exercise could be undertaken against a particular set of clinical standards.

In 2017, the UK Chartered Society of Physiotherapy (CSP) collaborated with the Royal College of Physicians (RCP) on a sprint audit of hip fracture rehabilitation services in England and Wales.⁹¹ The audit was undertaken through the UK NHTD. Key findings included the following:

- Mobilisation occurred for 68% of patients on the day after surgery
- During the first week after surgery, patients averaged two hours of physiotherapy
- Home rehabilitation started for 21% of patients within one week of discharge
- Physiotherapy was provided by 20% of services for more than four days of the first week home.

In 2018, the UK CSP published seven standards for hip fracture rehabilitation in physiotherapy practice:⁹²

1. A physiotherapist assesses all patients on the day of, or day following, hip fracture surgery
2. All patients are mobilised on the day of, or day following, hip fracture surgery
3. All patients receive daily physiotherapy that should total at least two hours in the first seven days post-surgery
4. All patients receive at least two hours of rehabilitation in subsequent weeks post-surgery until they have achieved their goals
5. All patients moving from hospital to the next phase of rehabilitation are seen by their new rehabilitation provider within 72 hours
6. A physiotherapist is part of every hip fracture programme's monthly clinical governance meeting
7. Physiotherapists share their assessment findings and rehabilitation plans with all rehabilitation providers to enable clear communication with the multidisciplinary team.

Where physiotherapist resources are limited or lacking, these standards can be applied to any healthcare personnel whose focus is to provide assistance in the recovery of patients' mobility and function. Dependent upon the healthcare resources available locally, these services could be provided by nurses, occupational therapists or physicians, as possible.

For the purposes of this Clinical Toolkit, the stepwise approach to rehabilitation of fragility fracture patients will be informed by the UK CSP standards.⁹²

However, colleagues could choose any of the clinical standards described in the next section to inform their initial benchmarking exercise. As stated for Pillar I, ideally, national standards tailored to each country's healthcare system will be developed in due course.

Preparatory: The institution has no system in place to reliably provide rehabilitation to fragility fracture patients

Objectives:

- Identify the "rehabilitation champion(s)" in the hospital and/or primary care organisation.
- Establish a rehabilitation sub-group of the organisation's multidisciplinary fragility fracture project team with representation from all relevant clinical and administrative functions, noting that as indicated previously in [Figure 3](#), rehabilitation spans the entire clinical pathway from acute fracture management to secondary fracture prevention in the long term. (Note: in low-resource settings with very few rehabilitation physicians and physiotherapists, this may not be feasible. In such circumstances, a concerted effort should be spearheaded by an individual physician or physiotherapist in close collaboration with the orthopaedic surgeon, who would determine when ambulation would begin.)
- To ensure that recipients of care have a voice within the project team, invite representatives of patients and carers.
- Agree on the scope of the pilot programme in terms of types of fractures to be provided with rehabilitation e.g. one or more of the following groups: individuals who sustain hip fractures and/or individuals admitted to hospital with a fragility fracture at any skeletal site and/or individuals with a fragility fracture managed exclusively in the outpatient setting and/or individuals with vertebral fractures identified opportunistically while undergoing spinal imaging for other medical conditions.
- Map current pathways of care for individuals presenting with the types of fragility fractures that are included in the scope of the pilot programme (see the previous sub-section on pathway mapping).
- Consider benchmarking provision of care against some or all of the seven clinical standards in the UK CSP standards for hip fracture rehabilitation in physiotherapy practice⁹² or another clinical standard of your choosing (see next section on benchmarking of care).
- Indicators are provided for each UK CSP standard e.g.
 - ▶ Clinical Standard 2:
 - a. Any healthcare worker may perform the task of getting a patient out of bed
 - b. The type of worker(s) involved in getting the patient out of bed is accurately identified (FFN additional comment: in low-resource settings, the direction to ambulate will usually come from the orthopaedic surgeon)
 - c. A clear and consistent method for recording getting out of bed is in place

- d. The NHFD data processor is able to identify when a patient gets out of bed for the purposes of NHFD data entry
 - e. A physiotherapist leads modifying physiotherapy treatment plans to enable patients experiencing dementia, delirium, pain and hypotension to get out of bed on the day of, or the day following, hip fracture surgery, where possible
 - f. A physiotherapist reviews any patient who does not mobilise within 24 hours (and the surgeon should be involved to identify any operative issues).
- Develop a protocol for a short-term local audit to benchmark care of in-scope fragility fracture patients presenting consecutively to your institution for one to two months prospectively (of the order 40 to 60 patients) or using routinely collected hospital data to do this retrospectively.
 - Review the findings of the short-term audit and prioritise specific aspects of care to be improved as a pilot project.
 - As suggested in [Chapter 5](#) of the orthogeriatric textbook (2nd edition)⁴ on establishing an orthogeriatric service, when analysing care gaps, use a strategy such as the “five whys” to establish the root cause of the problem (i.e. ask the question “Why does this care gap exist?” five times)³⁵ or a tool such as SWOT analysis (strengths, weaknesses, opportunities and threats).³⁶
 - Informed by the current pathway mapping exercise and the answers to the “five whys” or SWOT analysis, consider how existing resources could be reconfigured to deliver the prioritised aspects of rehabilitation from the perspective of people, processes and technology.
 - Implement the pilot programme for a pre-specified period – which is likely to be 3–6 months – and document delivery of the prioritised aspects of care.

Expansion: A pilot programme has been operating with minimal new financial and human resources

Objectives:

- Review the pilot programme to identify strengths and areas for improvement, and consider whether the expansion phase will include other fracture types.
- Dependent on the scope of the pilot programme – in terms of the specific aspects of rehabilitation prioritised for improvement and the types of fragility fractures that were in scope – agree on a stepwise process to improve all aspects of rehabilitation described within the benchmark clinical care standard during the next 1–2 years.
- Review the clinical pathway in light of quality improvements made during the pilot programme.
- Consider what new resources will be required to enable adherence with all aspects of the benchmark clinical care standard, from the perspective of people, processes and technology
- Develop programme protocols for the broader programme scope.
- Develop a fully costed business case to implement the expanded programme in the mid-term (i.e. 2–3 years), which includes key performance indicators agreed with the programme funder (a [generic business case template](#) is available on the FFN website).

- Embed an iterative “Plan-Do-Study-Act” (PDSA),³⁷ LEAN³⁸ and/or Six Sigma³⁹ quality improvement methodology (or similar) into the programme design, to review performance and identify opportunities for refinement in an ongoing fashion, according to a pre-specified time frame (each cycle should be of the order 6–12 months in duration).
- Produce annual programme reports for funders and all clinical stakeholders.
- Participation in local, regional and/or national fragility fracture registries would provide a mechanism to demonstrate adherence with relevant clinical standards, which would offer reputational advantage to the institution.
- Explore opportunities for networking and mentorship e.g. through the FFN Hip Fracture Recovery Research Special Interest Group (SIG), Vertebral Fracture SIG or the FFN Physiotherapy SIG.

Sustainability: Incorporation of an effective orthogeriatric programme into long-term budgetary planning

Objectives:

- The primary objective of the sustainability stage is to persuade funders to make a permanent investment in the people, processes and technology required to deliver an effective rehabilitation programme for the institution in the long term.
- A fully costed business case is required to model the impact of the expanded programme on future fragility fracture cases resulting in hospital admission, based on:
 - ▶ outcomes for individuals managed by the expanded service during the first 2–3 years of operations, recovery of pre-fracture function, prevention of secondary fractures, quality of life, and short- and long-term mortality
 - ▶ avoidance of readmissions to the institution in terms of bed days saved
 - ▶ cost savings to the health and care system and which function(s) within the health and care system were the principal beneficiary of those savings.
- Ongoing participation in local, regional and/or national hip fracture registries as a commitment to continuous quality improvement.
- Publication of the performance of the programme in peer-reviewed journals and presentation at regional, national and international conferences provides opportunities to share best practice and for the institution to be recognised as a Centre of Excellence in the delivery of rehabilitation.

Benchmarking care: clinical guidelines, standards and registries

Clinical guidelines for hip fracture care usually include commentary on physiotherapy, occupational therapy and rehabilitation, such as those from Australia and New Zealand³⁴ and the UK.²² However, as noted in a scoping review of potential quality indicators for hip fracture care, for literature published between January 2000 and January 2016, there was a paucity of indicators and potential indicators in the post-acute period.⁹³

As described in the previous section, pursuant to conducting a “sprint audit” in 2017 in collaboration with the RCP, facilitated by the UK NHFD,⁹¹ the UK CSP published seven clinical standards for hip fracture rehabilitation in physiotherapy practice in 2018.⁹²

In 2017, the Rehabilitative Care Alliance in Ontario, Canada published *Rehabilitative Care Best Practices for Patients with Hip Fracture*.⁹⁴ This document describes a framework which identifies best practices in various settings across the continuum of care, including bedded, ambulatory and in-home rehabilitation, and long-term care. The framework complements Health Quality Ontario's *Quality Standard for Hip Fracture: Care for People with Fragility Fractures*, which describes best practices from admission through surgery, post-operative rehabilitation and follow-up care.⁴⁰

In 2018, members of the FFN Physiotherapy SIG published a review on physiotherapy following fragility fractures.⁹⁵ It provides an overview of guidelines relevant to physiotherapy after hip fracture, evidence for physiotherapy after vertebral fragility fractures, and physiotherapy within the acute and later stages of rehabilitation after hip fracture, including suggestions for easily applicable outcome measures for the assessment of pre-fracture function, mobility and pain.

In 2020, American Physical Therapy Association (APTA), with experts from USA and Denmark (including several members of the FFN Physiotherapy SIG) appointed by the Academy of Orthopaedic Physical Therapy and APTA Geriatrics (an academy of the APTA), published *Clinical Practice Guidelines for Physical Therapy Management of Older Adults with Hip Fracture*.⁹⁶ The guideline provides recommendations for interventions, examination and outcome measures based on the available evidence across the continuum of care from acute to end of rehabilitation.

The FFN Hip Fracture Recovery Research Special Interest Group (FFN HFRR SIG) is comprised of clinicians who are committed to sharing best practice in hip fracture recovery with colleagues throughout the world. Further, the FFN Physiotherapy SIG is focused on creating a collaborative working group of physiotherapists within the FFN that includes clinical practitioners, educators and researchers who are involved in the whole management pathway of care for fragility fracture patients. The FFN Vertebral Fragility Fracture (VFF) SIG takes a holistic approach to the diagnosis, management, rehabilitation and prevention of VFF by assembling a multidisciplinary, international community. The VFF SIG activities have also focused on the development of an evidence-based model of care that would follow the clinical pathway/patient journey for all men and women with VFF.



*If you are interested in joining the
FFN HFRR SIG, click here*



*If you are interested in joining the
FFN Physiotherapy SIG, click here*



*If you are interested in joining the
FFN VFF SIG, click here*

Patient-reported outcomes measures

The Cumulated Ambulation Score (CAS)⁹⁷ was specifically developed for monitoring the process of getting hip fracture patients out of bed in a standardised fashion. CAS includes two basic activities of sit-to-stand from a chair with armrests, and indoor walking, which serve as excellent short-term goals for recovery of function after a fragility fracture. CAS can be used by all healthcare professions and also will be recommended in the APTA clinical practice guideline.⁹⁶ A recent study from the Danish Hip Fracture Database⁹⁸ showed an increased risk of 30-day mortality (HR 2.76; 95% CI 2.01–3.78) and readmission (HR 1.26; 95% CI 1.07–1.48) in patients not recovering their pre-fracture basic mobility level, evaluated with CAS, when discharged from the acute hospital. CAS is available in Italian,⁹⁹ Spanish¹⁰⁰ and Turkish,¹⁰¹ and French and Japanese versions are in the peer-review process at the time of writing of this Toolkit.

The Griffiths *et al.* study described in the section on PROMs relating to acute fracture care concluded that measurement of global quality of life is the key issue as compared to rehabilitation specific outcomes, *per se*.⁶³ While balance training can improve mobilisation domains of health, it can also impact on anxiety and depression domains through a linkage to fear of falling.

Objective functional outcomes assessments are also widely used to supplement PROMs when assessing outcomes related to rehabilitation e.g. Timed Up and Go,¹⁰² six-minute walk test¹⁰³ and the Short Physical Performance Battery.¹⁰⁴ However, these assessments are more amenable to collection in the research setting rather than during routine clinical practice.

Resources to support implementation

Templates

- [Generic Rehabilitation Service Business Case Template](#) available for download from the FFN website.

Orthogeriatric textbook (2nd edition): cross-cutting issues

In addition to Chapters 12–13 and 17–18, which focus on aspects of rehabilitation, the following chapter on cross-cutting issues is also relevant:

- [Chapter 19: Fragility Fracture Audit](#). Ojeda-Thies C *et al.*

Other rehabilitation resources

Members of the FFN Hip Fracture Recovery Research SIG have published the following reviews:

- [Rehabilitation Interventions for Older Individuals With Cognitive Impairment Post-Hip Fracture: A Systematic Review](#). Resnick *et al.*¹⁰⁵
- [Identifying Research Priorities around Psycho-Cognitive and Social Factors for Recovery from Hip Fractures: An International Decision-Making Process](#). Auais *et al.*¹⁰⁶
- [Residual Disability, Mortality, and Nursing Home Placement After Hip Fracture Over 2 Decades](#). Abraham *et al.*¹⁰⁷

Resources to engage and inform individuals about recovery after fragility fractures



*Click here to see further resources
(listed under Clinical Pillar I)*

Clinical Pillar III:

Reliable delivery of secondary fracture prevention after every fragility fracture



Box 5

Further reading

The four chapters of the orthogeriatric textbook (2nd edition)⁴ which focus on aspects of secondary fracture prevention are recommended additional reading:

- **Chapter 4:** Frailty and sarcopenia. Martin F and Ranhoff AH.
- **Chapter 14:** Fracture risk assessment and how to implement a Fracture Liaison Service. Fuggle N *et al.*
- **Chapter 15:** Current and emerging treatment of osteoporosis. Napoli N and Tafaro L.
- **Chapter 16:** How can we prevent falls? Blain H.

The three chapters of the Fragility Fracture Nursing textbook⁵ which focus on aspects of secondary fracture prevention are also recommended additional reading:

- **Chapter 1:** Osteoporosis and the Nature of Fragility Fracture: An Overview. Oostwaard M.
- **Chapter 2:** Frailty, Sarcopenia and Falls. Marques A and Queiros C.
- **Chapter 3:** Falls and Secondary Fracture Prevention. Santy-Tomlinson J *et al.*

Clinical and cost-effectiveness of secondary fracture prevention

All individuals who sustain fragility fractures should undergo assessment for bone health and falls risk.

Individuals who sustain an index fragility fracture are at high risk of sustaining subsequent fractures. Meta-analyses have demonstrated that a history of fracture at any skeletal site is associated with an approximate doubling of future fracture risk.^{108,109}

During the last two decades, the temporal relationship between index fracture and secondary fractures has been explored. In 2004, Swedish investigators examined the pattern of fracture risk following a prior fracture at the spine, shoulder or hip.¹¹⁰ During a five-year follow-up period, one third of all subsequent fractures occurred within the first year after fracture, and less than one tenth of all subsequent fractures occurred in the fifth year.

More recently, several studies have demonstrated that secondary fracture risk is highest during the two years following an index fracture, which has been characterised as the period of “imminent fracture risk”.¹¹¹⁻¹¹³ From the obverse perspective, since the 1980s, it has been reported that approximately one half of individuals who sustain hip fractures have broken another bone in the months or years before breaking their hip.¹¹⁴⁻¹¹⁷

Put simply, fracture begets fracture; they tell us they are coming.

Since the 1990s, effective pharmacological treatments have been available throughout the world that reduce the risk of secondary fractures. However, as noted in the second edition of the IOF Compendium of Osteoporosis published in 2019,¹¹⁸ usual care results in less than one fifth of individuals undergoing bone health assessment, and even then effective pharmacological treatments are prescribed in less than half of patients.¹¹⁹ Further, with the exception of data submitted to hip and other fragility fracture registries,^{45 47 54 59 120} little is known about rates of falls risk assessment among individuals who sustain fragility fractures.

Given that numerous clinical guidelines for osteoporosis management or falls prevention advocate routine secondary preventive assessment be conducted after occurrence of any fragility fracture, the current ubiquitous care gap imposes an avoidable burden on older people and their families, health systems and national economies. The fracture liaison service (FLS) model of care, which is outlined in this section of the Clinical Toolkit and described in more detail in [Chapter 14](#) of the orthogeriatric textbook (2nd edition)⁴ and [Chapter 3](#) of the Fragility Fracture Nursing textbook,⁵ has been shown to achieve substantial improvements in the quality of care provided^{121 122} and significant reductions in overall costs associated with caring for individuals who sustain fragility fractures.¹²³⁻¹²⁶

The costs of confronting osteoporosis: cost study of an Australian fracture liaison service

In 2018, investigators from the John Hunter Hospital (JHH) in New South Wales, Australia described the impact of their FLS on secondary fracture rates and costs.¹²⁶ Using hospital records, the JHH group compared secondary fracture experience for two groups:

- The FLS Cohort ($n=515$) who attended the emergency department at JHH and were offered FLS post-fracture care
- The Usual Care Cohort ($n=416$) who attended an emergency department at a hospital without an FLS.

Cohort costs were estimated for every 1,000 patients over a three-year period of observation. Compared with the Usual Care Cohort, the FLS Cohort had 62 fewer fractures per 1,000 patients in three years, resulting in savings of AUD \$617,275 (USD \$425,920, euro €382,710).

The organisation of fracture liaison services

The purpose of an FLS is to ensure that all individuals who present to urgent care services with a fragility fracture undergo fracture risk assessment and receive treatment in accordance with prevailing national clinical guidelines for osteoporosis. The FLS should also ensure that falls risk is addressed among older patients through referral to appropriate local falls prevention services.

The way in which FLS are organised varies considerably throughout the world. In 2013, Ganda *et al.* undertook a systematic review and meta-analysis of models of care designed to deliver secondary fracture prevention.¹¹⁹ The various models were classified as follows:

- **Type A – 3i FLS model:** FLS personnel took direct responsibility to identify fracture patients, organise appropriate investigations and initiate osteoporosis treatment, where indicated.
- **Type B – 2i FLS model:** The same as the Type A model regarding identification and investigation. However, where osteoporosis treatment was indicated, the FLS would make a recommendation to the patient's primary care provider to initiate treatment and advise the primary care provider of investigations that led to this recommendation.
- **Type C – 1i FLS model:** The primary care provider is alerted that the patient has sustained a fracture and that further assessment is needed. This model leaves the investigation and initiation of treatment to the primary care provider.

- **Type D – ‘Zero i’ FLS model:** This model only provides osteoporosis education to the fracture patient. The primary care provider is neither alerted nor provided with a recommendation.

The findings of the meta-analysis regarding the proportion of patients who underwent bone mineral density (BMD) testing and received treatment are shown in [Table 1](#). In 2019, an update to the meta-analysis was published, which included additional FLS publications to mid-2017, and reported the following comparisons relating to osteoporosis treatments:¹²²

- **Type A versus Type C FLS models:** A risk difference of 0.29 (95% CI 0.26–0.32, $p < 0.001$) was calculated indicating a 29% absolute difference in treatment initiation rates between the two models (favouring the Type A model).
- **Type B FLS models versus usual care:** A risk difference of 0.16 (95% CI 0.12–0.21, $p < 0.001$) was calculated indicating a 16% absolute difference in treatment initiation rates between the Type B FLS model and usual care (favouring the Type B model).
- **Type C FLS models versus usual care:** A risk difference of 0.13 (95% CI 0.09–0.16, $p < 0.001$) was calculated indicating a 13% absolute difference in treatment initiation rates between the Type C FLS model and usual care (favouring the Type C model).

A clear message from these findings is that the more intensive FLS models result in a higher proportion of fracture patients undergoing bone mineral density testing and receiving osteoporosis treatment. The original meta-analysis by Ganda *et al.* noted that among the FLS evaluated, 85%, 75% and 60% of Type A, Type B and Type C models of care, respectively, employed a dedicated FLS coordinator, highlighting the importance of this role.¹¹⁹ A limitation was that information on falls assessment was not reported.

Table 1

Bone mineral density (BMD) testing and treatment rates for different FLS models¹¹⁹

Model	BMD testing	Osteoporosis treatment
Type A – 3i FLS model	79%	46%
Type B – 2i FLS model	60%	41%
Type C – 1i FLS model	43%	23%
Type D – Zero i FLS model	—	8%

FLS have been established in both the primary care and secondary care settings. However it is configured, a primary function of an FLS is to ensure a seamless transition of care between the hospital and community settings.

In 2020, informed by a systematic literature review, a European League Against Rheumatism (EULAR) Taskforce developed points to consider for non-physician health professionals to prevent and manage fragility fractures in adults aged 50 years or over.¹²⁷ The seven points to consider urged non-physician health providers to do the following:

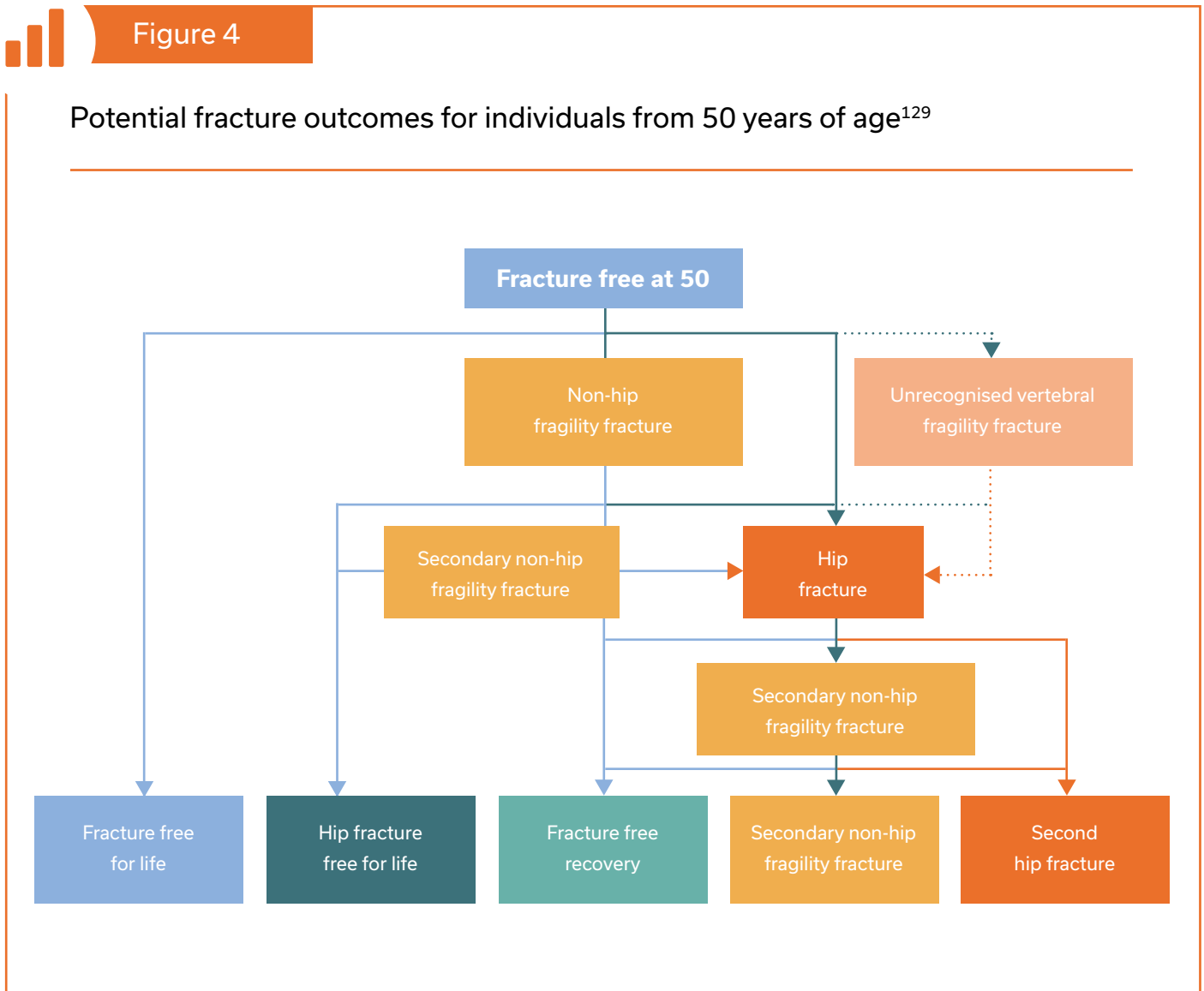
1. Identify patients who are at risk of fragility fracture and ensure they are given opportunities for adequate treatment and health education to encourage behaviour change that leads to fewer falls and fractures
2. Begin with fall-risk evaluation for patients who are at risk of fragility fracture, using an individualised approach to multi-component screening
3. Offer individualised exercise, nutrition, education and environmental interventions to patients who are at high risk for osteoporotic fracture or falls
4. Counsel patients to avoid smoking and the overuse of alcohol
5. Ensure patients with prior fragility fractures have opportunities for adequate exercise and nutrition, and discuss daily recommended calcium and vitamin D intake and supplementation

6. Refer patients with fragility fractures to an FLS for a coordinated, multidisciplinary post-fracture prevention programme
7. Monitor and support medication adherence during follow-up.

Mapping current pathways of care for secondary fracture prevention

The majority of fragility fractures occur among individuals aged 50 years and over. Potential fracture outcomes for individuals in this age group are illustrated in Figure 4. A study based on records from the UK General Practice Research Database (GPRD) reported the remaining lifetime risk of any fracture at age 50 as 53% for women and 21% for men.¹²⁸ Thus, less than half of women will be fracture-free for life. The same study estimated remaining lifetime risks of fracture by gender at age 50 as follows:

- **Women:** hip 11.4%, wrist 16.6%, vertebra 3.1%
- **Men:** hip 3.1%, wrist 2.9%, vertebra 1.2%



A critical step in the development of an effective secondary fracture prevention programme is to map current pathways of care for individuals who sustain different types of fragility fractures. Pathways will vary by fracture type, musculoskeletal service configuration (including orthopaedics, geriatrics, endocrinology, rheumatology and primary care), organisation of urgent care services, and urban versus remote and rural settings. In some countries, in major cities, practically all individuals who sustain a fracture would seek care at a local hospital, while in other countries certain types of fractures (e.g. wrist) are usually managed in community-based ambulatory/outpatient/primary care clinics. In some low- and middle-income countries, a proportion of individuals who sustain fractures may not seek healthcare advice at all.

FFN has developed a set of resources to support clinicians to visualise current pathways and consider how redesign could improve quality of care.



Click here to access these resources

A stepwise approach to implementation of Clinical Pillar III of the Global Call to Action

As we have established, multidisciplinary teams in an institution are likely to be broadly at one of three stages of development: **preparatory**, **expansion** or **sustainability**. In the context of secondary fracture prevention, a quality improvement initiative devised by the Asia Pacific Bone Academy FLS Focus Group considered the three stages of development to be akin to those stated below.¹³⁰ This Toolkit also proposes specific objectives for each stage.

Preparatory: The institution has no system in place to reliably deliver secondary fracture prevention

Objectives:

- Identify the “secondary fracture prevention champion(s)” in the hospital and/or primary care organisation.
- Establish a secondary fracture prevention sub-group of the organisation’s multidisciplinary fragility fracture project team with representation from all relevant clinical and administrative functions.
- Invite representatives of patients and carers to ensure that recipients of care have a voice within the project team.
- Agree on the scope of the pilot programme in terms of types of fractures to be identified and assessed e.g. one or more of the following groups: individuals who sustain hip fractures and/or individuals admitted to hospital with a fragility fracture at any skeletal site and/or individuals with a fragility fracture managed exclusively in the outpatient setting and/or individuals with vertebral fractures identified opportunistically while undergoing spinal imaging for other medical conditions.
- Map current pathways of care for individuals presenting with the types of fragility fractures that are included in the scope of the pilot programme (see the previous sub-section on pathway mapping) and determine the best environment for identification to occur e.g. emergency department, wards, outpatient fracture clinics etc.

- Consider benchmarking provision of care against clinical standards for FLS from IOF,¹³¹ Canada,¹³² Japan,¹³³ New Zealand¹³⁴ or the UK.¹³⁵
- Develop a protocol for a short-term local audit (for 1–2 months) of patients presenting consecutively with fragility fracture types that are in scope and benchmark care against the clinical standards chosen, noting that the audit could be done prospectively or using routinely collected hospital data to do this retrospectively.
- Review the findings of the short-term audit and identify aspects of secondary preventive care to be improved as a pilot project.
- When analysing care gaps, use a strategy such as the “five whys” to establish the root cause of the problem (i.e. ask the question “Why does this care gap exist?” five times)³⁵ or a tool such as SWOT analysis (strengths, weaknesses, opportunities and threats).³⁶
- Informed by the current pathway mapping exercise and the answers to the “five whys” or SWOT analysis, consider how existing resources could be reconfigured to deliver secondary preventive care from the perspective of people, processes and technology.
- Implement the pilot programme for a pre-specified period – which is likely to be 3–6 months – and document delivery of secondary fracture prevention

Expansion: A pilot programme has been operating with minimal new financial and human resources

Objectives:

- Review the pilot programme to identify strengths and areas for improvement.
- Dependent on the scope of the pilot programme – in terms of types of fractures identified – agree on an expanded scope of fractures to include all fragility fractures among individuals aged 50 years or over.
- Map current pathways of care for individuals presenting with all the types of fragility fractures that are included in the expanded scope (see sub-section on pathway mapping above).
- Consider what new resources will be required to deliver reliable secondary fracture prevention for the types of fragility fractures within the expanded scope among individuals aged 50 years or over, from the perspective of people, processes and technology.
- Develop programme protocols for the broader scope of fragility fracture types to be included in the expanded programme in accordance with clinical standards chosen as a benchmark.
- Consider how to deliver follow-up to ensure long-term adherence with osteoporosis treatment and ongoing participation in programmes to monitor adherence to any prescribed treatments (bone active medications, nutritional supplements, other) and reduce falls risk.
- Develop a fully costed business case to implement the expanded programme in the mid-term (i.e. 2–3 years), which includes key performance indicators agreed with the programme funder (a [generic business case template](#) is available on the FFN website and a patient-level key performance indicator set to measure the effectiveness of FLS and guide quality improvement is [here](#)).
- Embed an iterative “Plan-Do-Study-Act” (PDSA)³⁷, LEAN³⁸ and/or Six Sigma³⁹ quality improvement methodology (or similar) into the programme design, to review performance and identify opportunities for refinement in an ongoing

fashion, according to a pre-specified time frame (each cycle should be of the order 6–12 months in duration).

- Produce annual programme reports for funders and all clinical stakeholders.
- Participation in local, regional and/or national fragility fracture registries would provide a mechanism to demonstrate adherence with relevant clinical standards for secondary falls and fracture prevention, which would offer reputational advantage to the institution.
- Explore opportunities for networking and mentorship e.g. join the FFN Secondary Fragility Fracture Prevention Special Interest Group, FFN Vertebral Fragility Fracture Special Interest Group and the [IOF Capture the Fracture® Partnership Mentorship Programme](#).
- Consider opportunities to undertake a peer review of the expanded programme e.g. make a submission to the [IOF Capture the Fracture® Best Practice Recognition Programme](#).

Sustainability: Incorporation of an effective orthogeriatric programme into long-term budgetary planning

Objectives:

- The primary objective of the sustainability stage is to persuade funders to make a permanent investment in the people, processes and technology required to deliver a comprehensive secondary fracture prevention service for the institution in the long term.
- A fully costed business case is required to model the impact of the expanded programme on future fracture fragility cases, based on:
 - ▶ outcomes for individuals managed by the expanded service during the first 2–3 years of operations, including delivery of the 5IQ processes of care and secondary falls and fracture experience
 - ▶ avoidance of readmissions to the institution in terms of bed days saved
 - ▶ cost savings to the health system and which function within the health system was the principal beneficiary of those savings.
- Ongoing participation in local, regional and/or national fragility fracture registries as a commitment to continuous quality improvement (also see the IHI Breakthrough Collaboratives at www.ihl.org).
- Publication of the performance of the programme in peer-reviewed journals and presentation at regional, national and international conferences provides opportunities to share best practice and for the institution to be recognised as a Centre of Excellence in the secondary prevention of falls and fragility fractures.

Benchmarking care: clinical guidelines, standards and registries

Clinical guidelines on the management of osteoporosis highlight that individuals who have sustained fragility fractures are a readily identifiable group at high risk of second and subsequent fractures. During the last decade, clinical standards relating to acute care and secondary prevention of fragility fractures have been developed at the national and international level to enable benchmarking of care. Summaries of clinical standards relating specifically to FLS follow.

IOF Capture the Fracture® Best Practice Framework

In 2012, IOF launched the Capture the Fracture® programme with publication of the 2012 World Osteoporosis Day thematic report.¹³⁶ The components of Capture the Fracture® relating to clinical standards are as follows:

- **Best Practice Framework:** The Best Practice Framework (BPF), which is currently available in 14 languages, sets an international benchmark for FLS by defining essential and aspirational elements of service delivery. The BPF serves as the measurement tool for the IOF to award “Capture the Fracture® Best Practice Recognition” status. The 13 globally endorsed standards of the BPF were published in *Osteoporosis International* in 2013.¹³⁷
- **Patient-level key performance indicator set:** Developed in collaboration with the FFN Special Interest Group on Secondary Fragility Fracture Prevention and the National Osteoporosis Foundation (US), the Capture the Fracture® Working Group adapted existing metrics from the UK-based FLS Database¹²⁰ to develop a patient-level key performance indicator set for FLS.¹³¹

National and regional clinical standards for FLS

National clinical standards for FLS have been published in Canada,¹³² New Zealand,¹³⁴ Japan¹³³ and the UK.^{135,138} These standards are based on the 5IQ framework (i.e. standards relating to identification, investigation, information, initiation, integration and quality). In Australia, the state of New South Wales has clinical standards which relate to the FLS model of care as a frontrunner in system-wide implementation as part of the *Leading Better Value Care* policy strategy.¹³⁹

Registries

The sub-section on registries in Clinical Pillar I of this Toolkit described establishment of hip fracture registries in a growing number of countries throughout the world. These registries often collect data on bone health assessment and management, and falls prevention measures. Registries relating specifically to secondary fracture prevention for individuals with fragility fractures at all relevant skeletal sites have been developed in the UK and USA. Summaries follow.

UK FLS Database

In 2014, seven years after the launch of the UK NHFD, representatives of the Royal College of Physicians, Royal College of Surgeons, Health and Social Care Information Centre and National Osteoporosis Society explored options for a national FLS Database (FLS-DB). A facilities level audit was published in 2016¹⁴⁰ and annual clinical audits have been published for data collected during calendar years 2016,¹⁴¹ 2017¹⁴² and 2018.¹⁴³ Since the financial year 2017–2018, the FLS-DB has been included in the Healthcare Quality Improvement Partnership (HQIP) listing for national audits that must be reported in the Hospital Trust’s Quality Account. During 2018, 61 FLS across England and Wales contributed data on the care of 58,979 individuals with fragility fractures. Key findings and recommendations are provided in [Figure 5](#). Visit the website at <https://www.fffap.org.uk/fls/flsweb.nsf>. The performance of individual FLS can be viewed on publicly accessible run charts based on key performance indicators.

Figure 5

Bone mineral density (BMD) testing and treatment rates for different FLS models¹¹⁹

Key findings	Key recommendations
<p>36% Monitoring contact</p> <p>2018 saw monitoring decline for a second year, with only 36% of patients contacted at 12–16 weeks post fracture; down from 38% in 2017 and 41% in 2016.</p>	<p>FLS must urgently engage with their local primary care providers to develop improved pathways to improve monitoring, with documentation that captures importance of treatment adherence in this vulnerable patient group.</p>
<p>80% Identification</p> <p>10 out of 61 FLS are now submitting over 80% of their expected caseload for all fragility fractures. Spine fracture identification improved to 36% in 2018 from 29% in 2017.</p>	<p>All FLS should detail the steps required to achieve 80% of case load identification for 2020/2021. This will require FLS to define enhanced pathways for identification of fracture patients, including those with spine fractures.</p>
<p>67% Assessment</p> <p>Despite the increased volume of patients seen, the proportion assessed by FLS (70% in 2017 to 67% in 2018) or receiving dual-energy X-ray absorptiometry (DXA) scan within 90 days (46% in 2017 and 2018) has remained relatively stable.</p>	<p>With an expected increase in cases FLS should regularly review their capacity in order to maintain standards of time to assessment, including DXA scans and monitoring.</p>
<p>63% Quality Improvement</p> <p>Of the 53 FLS that submitted data for both 2017 and 2018, 33 (63%) had improved by at least one grade in a key performance indicator (KPI), and 8 (15%) improved in three or more KPIs. Six (12%) did not improve in any KPI and worsened in at least two KPIs.</p>	<p>FLS should dedicate staff time to deliver at least one complete cycle of quality improvement for their service in 2019/2020. The aim should be to improve in one KPI while maintaining existing performance in other KPIs.</p>

American Orthopaedic Association Own the Bone® programme

In 2009, the American Orthopaedic Association launched the Own the Bone® programme with the intention of supporting hospitals and other medical practices to deliver and evaluate FLS. In 2018, an analysis was published of 32,671 patients from the 147 sites then participating in Own the Bone®. Anti-osteoporosis treatment was recommended for almost 73% ($n=23,791$) of patients, which included 12% ($n=3,955$) who were started on treatment by the FLS programme staff.

In 2019, Own the Bone® was relaunched on the REDCap Cloud platform. As of July 2020, 262 sites from all 50 states were recruited into the programme, more than 58,000 patients had been assessed and 24,000 had completed follow-up. Hip fractures comprised more than half (55%) of patients assessed to date.

Visit the website at <https://www.ownthebone.org/>.

The FFN Secondary Fragility Fracture Prevention Special Interest Group (FFN SFFP SIG) is comprised of clinicians who are committed to sharing best practice in secondary fragility fracture prevention with colleagues throughout the world. Further, the Vertebral Fragility Fracture SIG (FFN VFF SIG) is focused on identification, assessment and treatment of vertebral fragility fractures.



*If you are interested in joining the
FFN SFFP SIG, click here*



*If you are interested in joining the
FFN VFF SIG, click here*

Patient-reported outcomes measures

- Osteoporosis Assessment Questionnaire-Physical Function (OPAQ-PF): a psychometrically validated osteoporosis-targeted PROM of daily activities of physical function.
- Interpreting change from patient reported outcome endpoints: patient global ratings of concept versus patient global ratings of change, a case study among osteoporosis patients.
- Patient Reported Outcomes Measurement Information System 29-item (PROMIS-29) generic PROM with domains across physical function, anxiety, depression, fatigue, sleep disturbance, ability to participate in social roles and activities, pain interference, and pain intensity. PROMIS-29 has performed well in older adult populations with multiple chronic conditions including osteoporosis.¹⁴⁴
- The Falls Efficacy Scale International (FES-I) is specifically developed to assess fear/concern of falling and available in an extensive number of languages.

Resources to support implementation

Templates

- [Generic FLS Business Case Template](#) available for download from the FFN website.
- [Generic FLS Coordinator Job Description](#) available for download from the FFN website.

International Osteoporosis Foundation



Capture the Fracture® partnership: summary

Capture the Fracture® programme

The IOF has developed Capture the Fracture® (CTF), a global flagship programme to support the implementation of coordinated, multidisciplinary models of care for secondary fracture prevention known as Fracture Liaison Services (FLS). Since its launch, Capture the Fracture® has welcomed a growing number of FLS into the programme and continues to facilitate the implementation of FLS.

About the Capture the Fracture® partnership initiative

As of late 2019, IOF has partnered with Amgen and UCB, in collaboration with the University of Oxford, to launch the Capture the Fracture® partnership. This long-term programme is supported by the largest global corporate-non-governmental organisation (NGO) partnership ever to be launched in the bone field. The official launch was announced by all partners on 16th June 2020.

Objectives and geographic areas of focus

This global programme is an expansion of the current CTF mission and will focus on five key pillars of action – Policy, Coalition, Mentorship, Scalable Solutions and Digital Tools – across 17 countries in Asia-Pacific, Europe, Latin America and the Middle East.

The partnership's key objectives are to:

- Foster the development and implementation of new CTF initiatives
- Double the number and quality of existing FLS programmes by the end of 2022
- Reduce the number of hip and vertebral fractures due to osteoporosis by 25% by 2025.

Summary of the Five Pillars of Action

PILLAR 1 – POLICY: drive fracture prevention policy changes that will prioritise bone health and post-fracture care through the implementation of FLS.

PILLAR 2 – COALITIONS: creation of international/regional/national fracture prevention coalitions to support the CTF mission – to make secondary fracture a top health priority.

PILLAR 3 – MENTORSHIP: FLS Best Practice Mentorship and Workshops to help promote the implementation of new FLS programmes, improve existing FLS programmes, and ensure sustainability.

PILLAR 4 – SCALABLE SOLUTIONS: establish scalable solutions to support FLS with quality improvement and scalability.

PILLAR 5 – FLS DIGITAL TOOL: creation of a global FLS database comparative tool which will help hospitals to develop quality improvement plans, facilitate the management of the patient pathways, and achieve sustainable FLS.

Visit the Capture the Fracture® website at <https://www.capturethefracture.org/>

Other FLS resources

- **Asia Pacific:** Asia Pacific Bone Academy *Fracture Liaison Service (FLS) Toolbox for Asia Pacific*
- **Australia:** NSW Agency for Clinical Innovation Osteoporosis Refracture Prevention Resources
- **Canada:** Osteoporosis Canada FLS Hub
- **New Zealand:** Osteoporosis New Zealand *FLS Resources*
- **UK:** Royal Osteoporosis Society *FLS Resources*
- **USA:** American Orthopaedic Association *Own the Bone®* programme

Fracture risk calculators

- FRAX®: <https://www.sheffield.ac.uk/FRAX/>
- Garvan: <https://www.garvan.org.au/promotions/bone-fracture-risk/calculator/>

Falls prevention resources

- **Australia and New Zealand:** Australian and New Zealand Falls Prevention Society *Resources*
- **Canada:** Canadian Fall Prevention Education Collaborative and Canadian Fall Prevention Curriculum *Resources and Links*
- **UK:** Age UK *Falls Prevention Resources*
- **USA:** National Council on Aging *National Falls Prevention Resource Center*
- **European Union:** Prevention of Falls Network for Dissemination – ProFouND

Orthogeriatric textbook (2nd edition): cross-cutting issues

In addition to Chapters 4 and 14–16, which focus on aspects of secondary fracture prevention, the following chapters on cross-cutting issues are also relevant:

- **Chapter 1:** The multidisciplinary approach to fragility fractures around the world – an overview. Marsh D *et al.*
- **Chapter 17:** Nursing in the Orthogeriatric Setting. Santy-Tomlinson J *et al.*
- **Chapter 18:** Nutritional Care of the Older Patient with Fragility Fracture. Bell J *et al.*
- **Chapter 19:** Fragility Fracture Audit. Ojeda-Thies C *et al.*

Resources to engage and inform individuals about bone health and secondary fracture prevention

Websites

- **International Osteoporosis Foundation:** Patient resources
- **Australia:** Osteoporosis Australia and the Garvan Institute of Medical Research: Know your Bones™ bone health assessment tool
- **Canada:** Osteoporosis Canada After the Fracture
- **New Zealand:** Bone Health New Zealand
- **UK:** Royal Osteoporosis Society Recovering from a broken bone
- **USA:**
 - ▶ National Osteoporosis Foundation Healthy Bones Build Them for Life® Patient Registry
 - ▶ Bone and Joint Initiative USA Fit to a T Program

Videos

- **Australia:** Orthopaedic Osteoporosis Service, Fiona Stanley Hospital, Perth, Western Australia
 - ▶ What is osteoporosis, how common is it, risk factors and bone density:
 - ▶ Living with osteoporosis, fracture prevention, treatment options
 - ▶ Education and lifestyle, falls prevention and exercise
- **UK:** Royal College of Physicians What to expect from your Fracture Liaison Service
- **USA:** Bone and Joint Initiative USA *Fit to a T Program*
 - ▶ What you need to know about your bone health and osteoporosis: in English and Spanish

COVID-19 and fragility fracture **care and prevention**

The COVID-19 pandemic has impacted delivery of all aspects of fragility fracture acute care, rehabilitation and secondary fracture prevention throughout the world. A substantial body of literature and analysis was published during the first half of 2020 and will doubtless continue through and beyond the pandemic. The majority of healthcare professional organisations have developed COVID-19 resource centres.

- **Geriatric medicine organisations:**
 - ▶ International Association of Gerontology and Geriatrics
 - ▶ American Geriatrics Society
- **Nursing organisations:**
 - ▶ International Council of Nurses
 - ▶ ANA Enterprise
- **Orthopaedic organisations:**
 - ▶ Alliance of International Organizations of Orthopaedics & Traumatology
 - ▶ American Academy of Orthopaedic Surgeons
- **Osteoporosis organisations:**
 - ▶ **International Osteoporosis Foundation:**
 - ▶ <https://www.osteoporosis.foundation/news/iof-member-societies-around-world-inform-covid-19-and-osteoporosis-20200520-0900>
 - ▶ <https://www.capturethefracture.org/covid-19-all-ctf-fls-centers>
 - ▶ National Osteoporosis Foundation (USA)
- **Rehabilitation organisations:**
 - ▶ International Society of Physical and Rehabilitation Medicine
 - ▶ American Physical Therapy Association

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