

BROKEN BONES, BROKEN LIVES:

A roadmap to solve the fragility
fracture crisis in the United Kingdom



FOREWORD

With fragility fractures affecting one in three women and one in five men aged 50 or above, nearly everyone has a family member or friend who has been affected by a fragility fracture. Yet how many of us stop to question the true cause of fragility fractures and simply assume them to be a 'normal' sign of ageing rather than the result of weakened bone? How many of us understand that an initial fracture may be a gateway to further fractures and should be treated as a warning sign and prompt us to seek out preventative treatment?

As the UK population ages, the incidence and contribution of fragility fractures to the overall healthcare spend continue to increase. In 2017, over half a million fragility fractures occurred in the UK with an associated healthcare cost of £5.25 billion. This annual expenditure is predicted to increase by 30%, to £6.83 billion, by 2030.

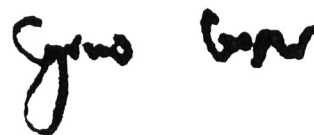
Any fracture is painful and distressing and can disrupt normal activities. An initial fracture significantly increases the risk of subsequent fractures and can trigger a negative spiral of healthcare dependence, escalating expense and impaired quality of life, despite the existence of treatments and programmes for secondary prevention of fragility fractures.

This report, **Broken bones, broken lives: A roadmap to solve the fragility fracture crisis in the United Kingdom**, explores the clinical, societal and cost burden associated with fragility fractures in the UK. The findings provide evidence that, despite the availability of effective preventative therapies and

management approaches for fragility fractures, more than 50% of UK women aged 50 years or above do not receive appropriate care in the year following a hip fracture.

Much has been done over recent years to highlight the impact and improve the management of falls and fragility fractures in the UK, such as the development of a national consensus statement by Public Health England, best practice care pathways by the National Osteoporosis Society (NOS) (e.g. RightCare pathway, RightCare Scenario) and national databases (e.g. the Royal College of Physicians' Falls and Fragility Fracture Audit Programme). However, despite these efforts, there remains an urgent need to recognise fragility fractures as a public health priority and to support the National Health Service (NHS) to integrate secondary fracture prevention and management as a core component of healthy ageing.

In addition to providing the latest state of play of fragility fracture care, the report serves as a roadmap, which includes policy recommendations that can assist national and local policymakers in offering the best possible care for their citizens in order to reduce the number of fractures and their impact on patients and the NHS.



Cyrus Cooper, IOF President

The International Osteoporosis Foundation (IOF) is a registered not-for-profit, non-governmental foundation based in Switzerland, which has been granted Roster Consultative Status with the Economic and Social Council of the United Nations. IOF functions as a global alliance of patient societies, research organisations, healthcare professionals and international companies working to prevent osteoporosis and fragility fractures worldwide. Striving for a world without fragility fractures, in which healthy mobility is a reality for all, the IOF is dedicated to advancing research and education, promoting policy change, increasing awareness of bone health and improving patient care.

The National Osteoporosis Society (NOS) is the only UK charity dedicated to ending the pain and suffering caused by osteoporosis and believes in better bone health for everybody. It does this by caring for and supporting people living with the condition, delivering an extensive range of professional development for healthcare professionals, promoting good bone health to prevent osteoporosis and funding research to help those affected. The NOS has firmly established its position as the leading national patient group for people with osteoporosis. Through its large member base, NOS has led effective bone health advocacy campaigns and is a driving force in the promotion and development of Fracture Liaison Services across the UK.



The development of this report has been supported by UCB. Full publication of the data included in this report is currently in development.

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GLOSSARY

BMD	Bone Mineral Density
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
CTF®	Capture The Fracture®
DALY	Disability-adjusted life year
EU6	France, Germany, Italy, Spain, Sweden and the UK
FLS	Fracture Liaison Service
FLS-DB	Fracture Liaison Service Database
GDP	Gross domestic product
ICER	Incremental cost-effectiveness ratio
ICUROS	International Costs and Utilities Related to Osteoporotic Fractures Study
IOF	International Osteoporosis Foundation
LTC	Long-term care
MOF	Major osteoporotic fracture (hip, spine, humerus or forearm fractures)
NHS	National Health Service
NOS	National Osteoporosis Society
QALY	Quality-adjusted life year



EXECUTIVE SUMMARY

This report provides an overview of the burden and management of fragility fractures in the UK and compares the national reality to that of the EU6 nations (France, Germany, Italy, Spain, Sweden and the UK). The report not only aims to highlight the burden and challenges posed by fragility fractures, but also to signpost opportunities for increased efficiencies in fragility fracture management and to realise improvements in patient care.

As the UK's population ages, the challenge of preserving the independence and active lifestyles of the ageing population has become a multifaceted challenge that technology, social initiatives and healthcare policy can help tackle.

With **over half a million new broken bones** occurring in the UK in 2017, fragility fractures are a major obstacle to healthy ageing, impacting the independence and quality of life of **3.5 million women and men** living with osteoporosis in the UK.

Fragility fractures can be prevented, but their prevention and management have long been neglected despite the massive associated costs for the NHS (**£5.25 billion in 2017**) and these are set to increase to £6.83 billion by 2030.

The burden of fragility fractures in the UK exceeds that for chronic obstructive pulmonary disease (COPD) and ischaemic stroke.

After a fragility fracture, individuals are **five times** more likely to experience a second fracture within the next 2 years. Despite this, less than half the women who sustain a hip fracture at or after the age of 50 go on to receive treatment for osteoporosis in the following year. Not unique to the UK, this massive treatment gap is observed consistently across Europe, reflecting the low importance that continues to be given to the escalating issue of fragility fractures in our ageing society.

With fragility fracture incidence in the UK predicted to increase by 26% by 2030, **now** is the time to **break** the cost spiral, and take action to put an end to the dire consequences of fractures on patients.

In its 70th year, the NHS, like many healthcare systems throughout the world, faces challenges that threaten its ability to make necessary change. These challenges include the rising demand from a growing and ageing population, the changing pattern of illness and need, and the financial and operational viability of its service model. However, these challenges are outweighed by opportunities, such as advances in new medicines and technology, the ability to harness data and information, and improvements in our understanding of different care models that are integrated and centred around patient need.

Policies should continue to play a significant role in promoting, funding and implementing innovative solutions for post-fracture care in the UK. For example, coordinated care models for patients following a fracture, such as a 'Fracture Liaison Service' or FLS (the first of which was created in Glasgow, Scotland), have proven to be both clinically effective and cost-effective: they have been shown to reduce further fractures, and lessening the burden on both healthcare and individuals at a reasonable investment cost. Besides FLSs, additional policy solutions adapted to the specificities of the UK healthcare system and policy landscape should also be considered to drive the improvements needed in fracture care.

The fragility fracture roadmap for the UK prioritises policy activities that can make a difference for patients with fragility fractures, focusing on: local service improvement, strengthening of national policy and raising awareness to change behaviour.



DID YOU KNOW THAT...

- Osteoporosis (which means 'porous bone') is a disease that weakens the density and quality of the bone, thus increasing the risk of fracture. The loss of bone is symptomatically silent and progressive, until the first fragility fracture occurs due to a low-trauma event, such as a fall from standing height or even a minor bump¹
- One in five men and one in three women aged ≥ 50 years will experience a fragility fracture in their remaining lifetime²
- A fragility fracture is a warning sign that has to be taken seriously: a fracture increases the risk of a subsequent fracture, which can occur at a different site³
- It is not only important to treat the existing fragility fracture but also to prevent subsequent breaks, i.e. secondary fracture prevention⁴
- *"By missing the opportunity to respond to the first fracture, healthcare systems around the world are failing to prevent the second and subsequent fractures"* (Professor Kristina Åkesson)⁵

“

Even sitting caused great pain;
it was better to lie flat or stand.
It even hurt to breathe.



David, UK

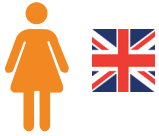
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THE SILENT BURDEN OF FRAGILITY FRACTURES FOR INDIVIDUALS AND HEALTHCARE SYSTEMS



The number of fractures and living with day to day pain made my life at times unbearable. I had to give up work, which made me feel a burden to my family.

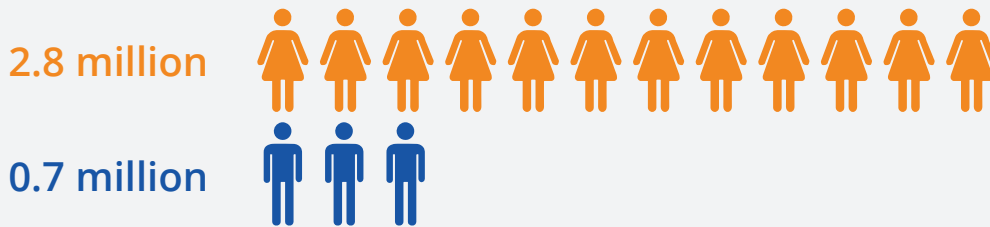
Karen, UK



Fragility fractures affect men and women across the UK

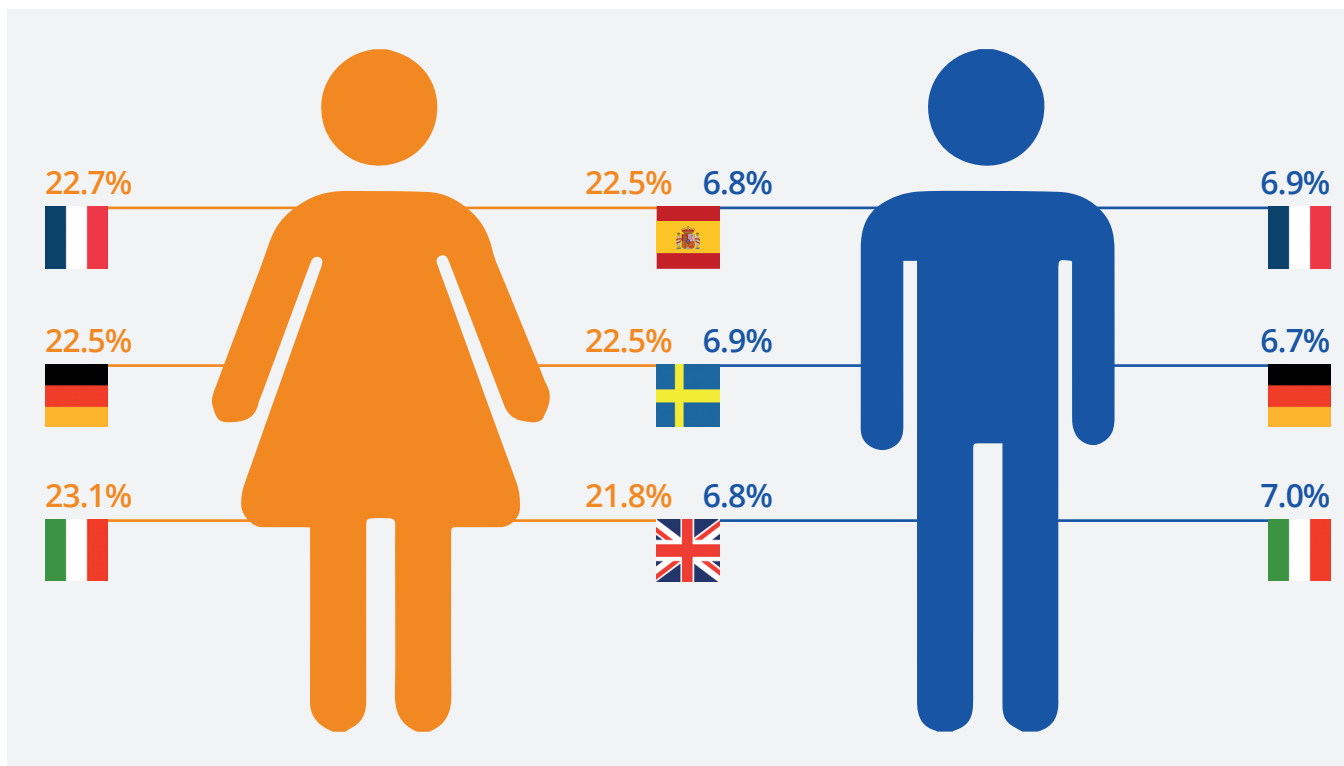
Prevalence of osteoporosis in the UK

Approximately...



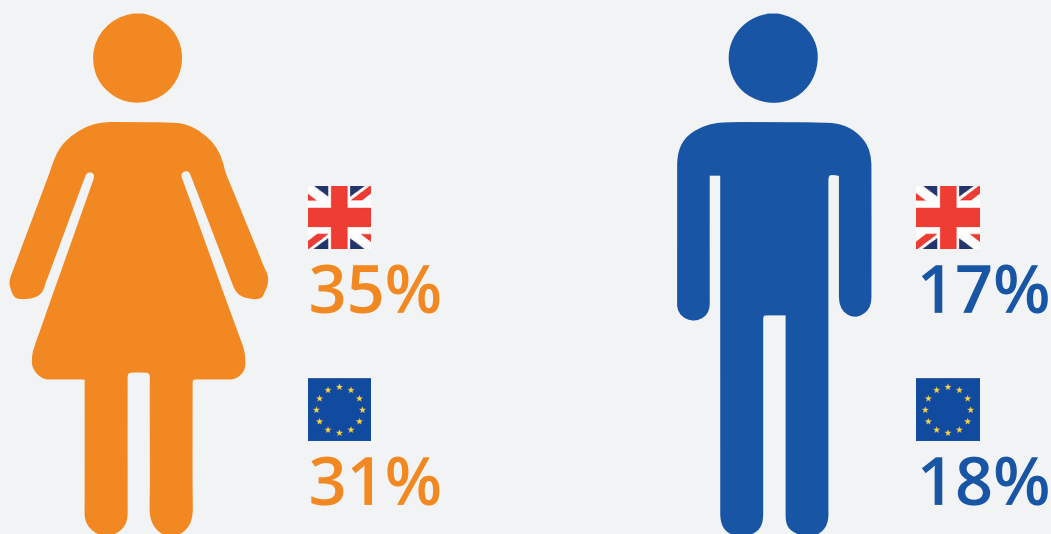
...3.5 million people in the UK have osteoporosis (assessed 2015).⁶

Prevalence of osteoporosis in the UK (21.8% for women; 6.8% for men) over the age of 50 years is comparable to that of France, Germany, Italy, Spain and Sweden, which together with the UK are hereafter referred to as the EU6 nations:⁷⁻¹¹



Lifetime risk of fragility fractures

At the age of 50 years, the remaining lifetime risk for a major osteoporotic fracture (MOF) is slightly higher for women in the UK compared with other EU6 countries, but similar for men:⁷



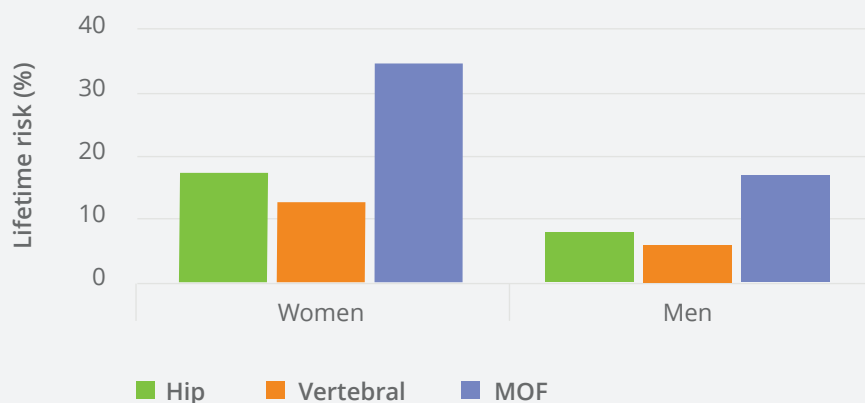
The lifetime risk of sustaining a fragility fracture varies for women and men, and by fracture site.

There is a marked difference in the risk of fracture between the EU6 countries, with Northern European countries having the highest fracture rates observed worldwide.

The reasons for the difference in fracture risk between countries are unknown and cannot be explained by differences in bone density. However, plausible factors include differences in body mass index, low calcium intake, reduced sunlight exposure and, perhaps the most crucial factor, socio-economic prosperity, which in turn may be related to low levels of physical activity.^{12,13}

Regardless of differences in fracture risk, the number of fractures in all countries is expected to increase due to an increasingly elderly population.

Lifetime risk of fragility fracture from the age of 50 years in the UK^{2,7,12,14-20}

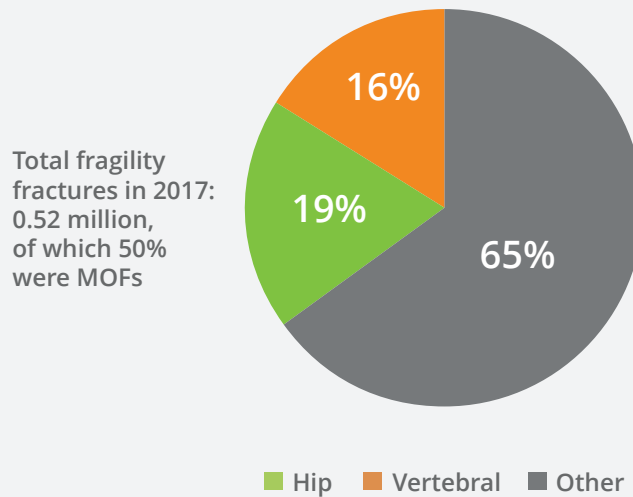


Fragility fracture incidence

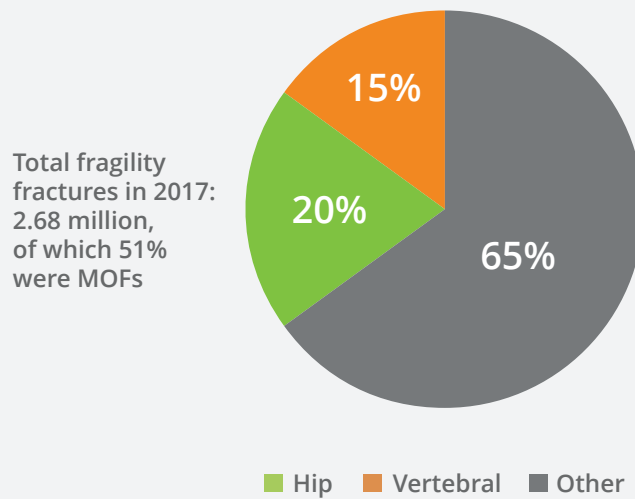
An estimated 520,000 fragility fractures occurred in the UK in 2017.⁶

Estimated number of fragility fractures in the UK in 2017 and the EU6, by fracture category

UK: distribution of fracture type



EU6: distribution of fracture type

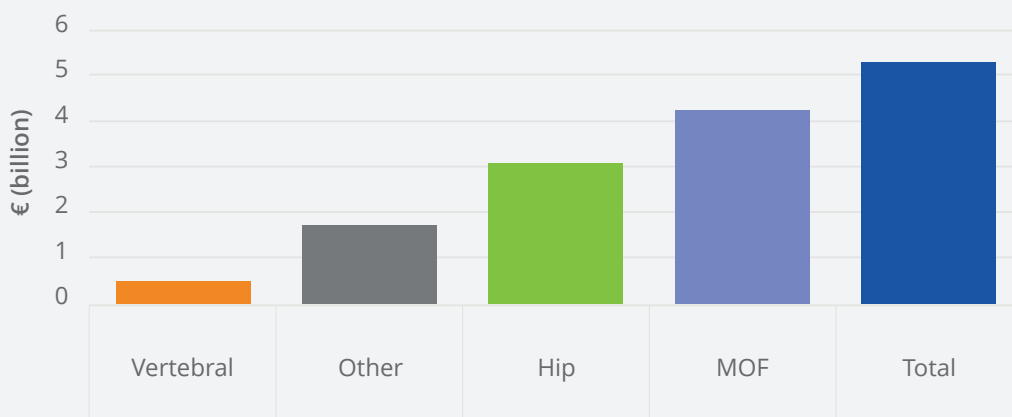


Fragility fractures incur substantial healthcare costs

Fragility fractures are associated with significant healthcare costs

In 2017, fracture-related costs totalled approximately **£5.25 billion** in the UK. Length of stay in secondary care following a fracture is an important driver of cost.

Estimated annual fracture-related costs in the UK in 2017



Fracture-related costs:^{21,22}



mostly occur in the first year following a fracture



differ between fracture sites and, to some extent, reflect the severity of fracture



tend to be highest with hip fractures, as this is the most severe fracture site

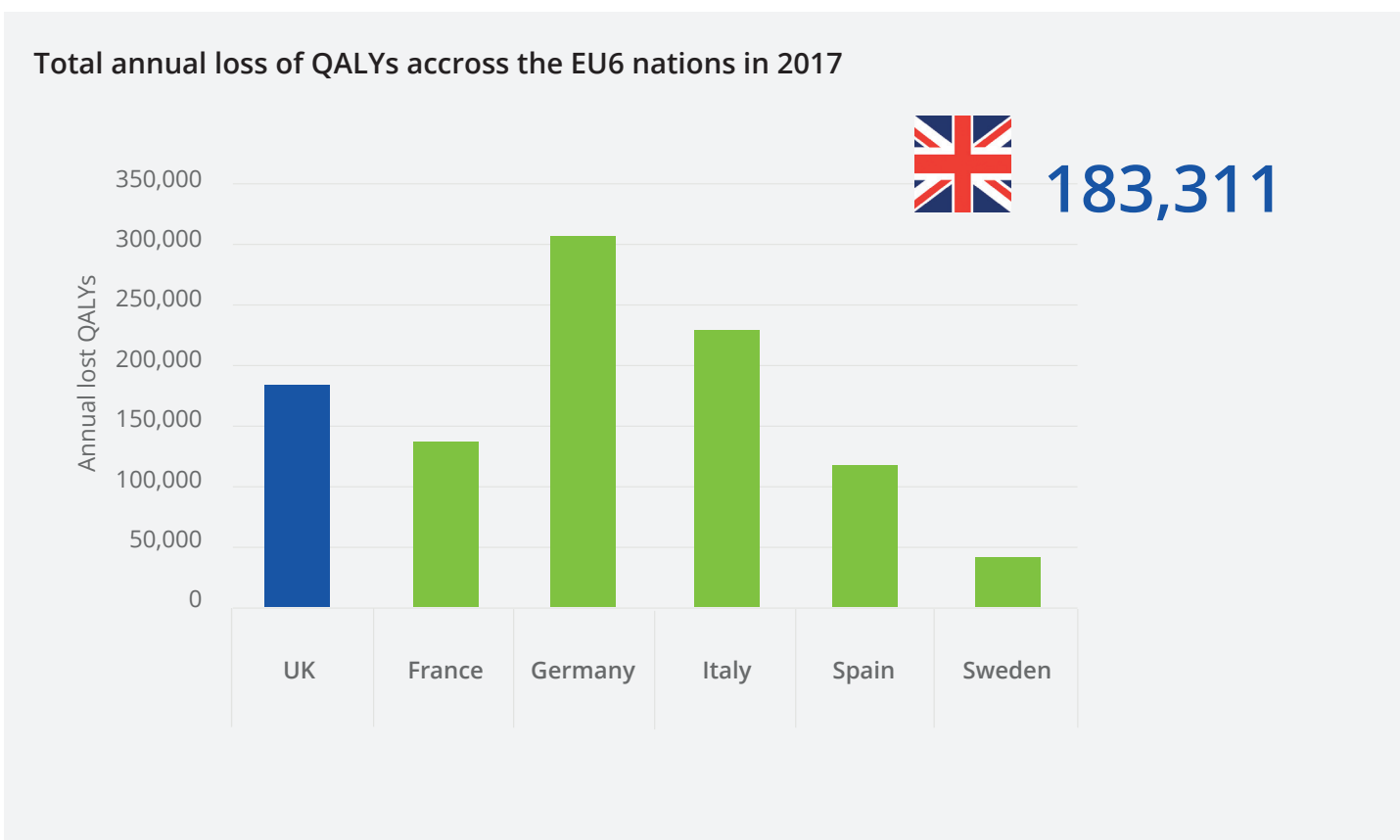
Fragility fractures place a high burden on patients and healthcare systems

The burden of fragility fractures on individuals is demonstrated here with the annual loss of quality-adjusted life years (QALYs).

QALYs are a measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life. One QALY is equal to 1 year of life in perfect health. QALYs are calculated by estimating the years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality-of-life score (on a 0 to 1 scale). It is often measured in terms of the patient's ability to carry out the activities of daily life, and freedom from pain and mental disturbance.²³

The loss of QALYs as a result of fragility fractures varies across the EU6 countries. These differences are largely driven by variations in the risk of fractures and age distribution between countries.⁶

The total health burden in 2017 due to fragility fractures in the UK is estimated to be 183,311 QALYs.



Fragility fractures have a multifaceted impact on the individual and society

Reduced independence and lifestyle impairment

A fracture not only affects people physically, but also emotionally. Knowledge of their increased fracture risk can negatively affect patients' outlook, causing them to change their levels of social interaction and to avoid certain activities: impairing their overall quality of life.²⁴

Patients with osteoporosis may face dramatic changes in their lifestyle due to constant pain, fear of breaking another bone and the emotional insecurity that can result from the physical effects of fractures.²⁵

- One in three people in long-term pain describe it as severe or unbearable, with only half of patients reporting having effective medication to help manage it²⁵
- One in four people with osteoporosis who were of working age at diagnosis have had to give up work, change their job or reduce their hours²⁵
- 54% of patients with a fragility fracture have experienced height loss or a change in their body shape, leading to loss of confidence²⁵
- 42% of people said their osteoporosis has made them feel socially isolated, with one in three people admitting to seeing their friends and relatives less often than they used to²⁵

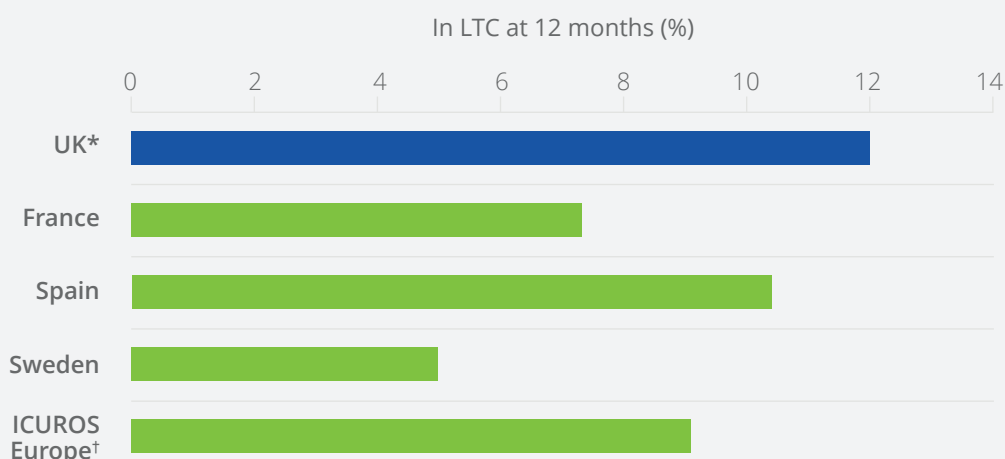
Reduced independence can be one of the most distressing outcomes for fracture sufferers. The disability associated with hip fractures can be severe. A month after experiencing a hip fracture, 8% of patients will have died and only half will have returned home. Of those who survive:

- 60% have difficulty with activities, such as feeding, dressing and going to the toilet
- 80% are unable to shop, garden or climb stairs
- 50% of people who previously walked unaided will no longer be able to walk independently in the year following a hip fracture

The long-term loss of independence and mobility can put physical, emotional and financial strain on patients, as well as their relatives and friends, potentially leading to the need for institutional care, particularly in older age groups.²⁶

In the UK, an estimated 12% of patients are discharged to long-term care (LTC) after a hip fracture.²⁷

Proportion of patients (%) in LTC at 12 months after a hip fracture, by country^{6,27}



*UK estimate based on discharge to LTC after a hip fracture²⁷

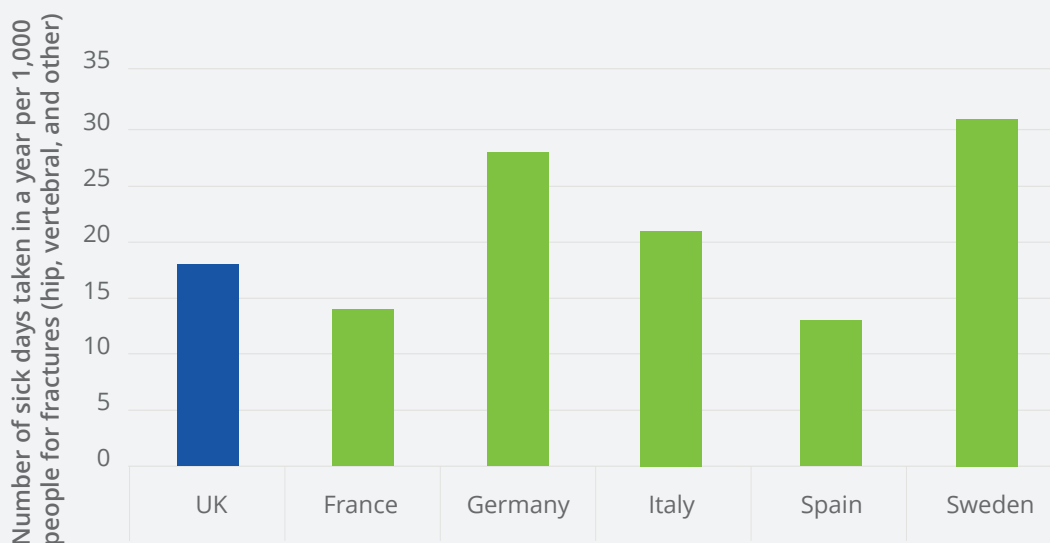
†International Costs and Utilities Related to Osteoporotic Fractures Study (ICUROS) Europe: Austria, Estonia, Spain, France, Italy and Sweden

Across Europe, the proportion of patients that move into LTC within a year of sustaining a hip fracture increases with age, from 2.1% at age 50–60 years to **35.3%** above 90 years.⁶

Fragility fractures can significantly impact the working population

Although fragility fractures mostly affect people in later life, an estimated 20% of fractures occur at pre-retirement age.² In 2017, a total of 7,615,719 sick days were taken across the EU6 as a result of fragility fractures; more than one-third of these (34%; 2,626,421 days) were taken by individuals of pre-retirement age living in the UK.²⁸

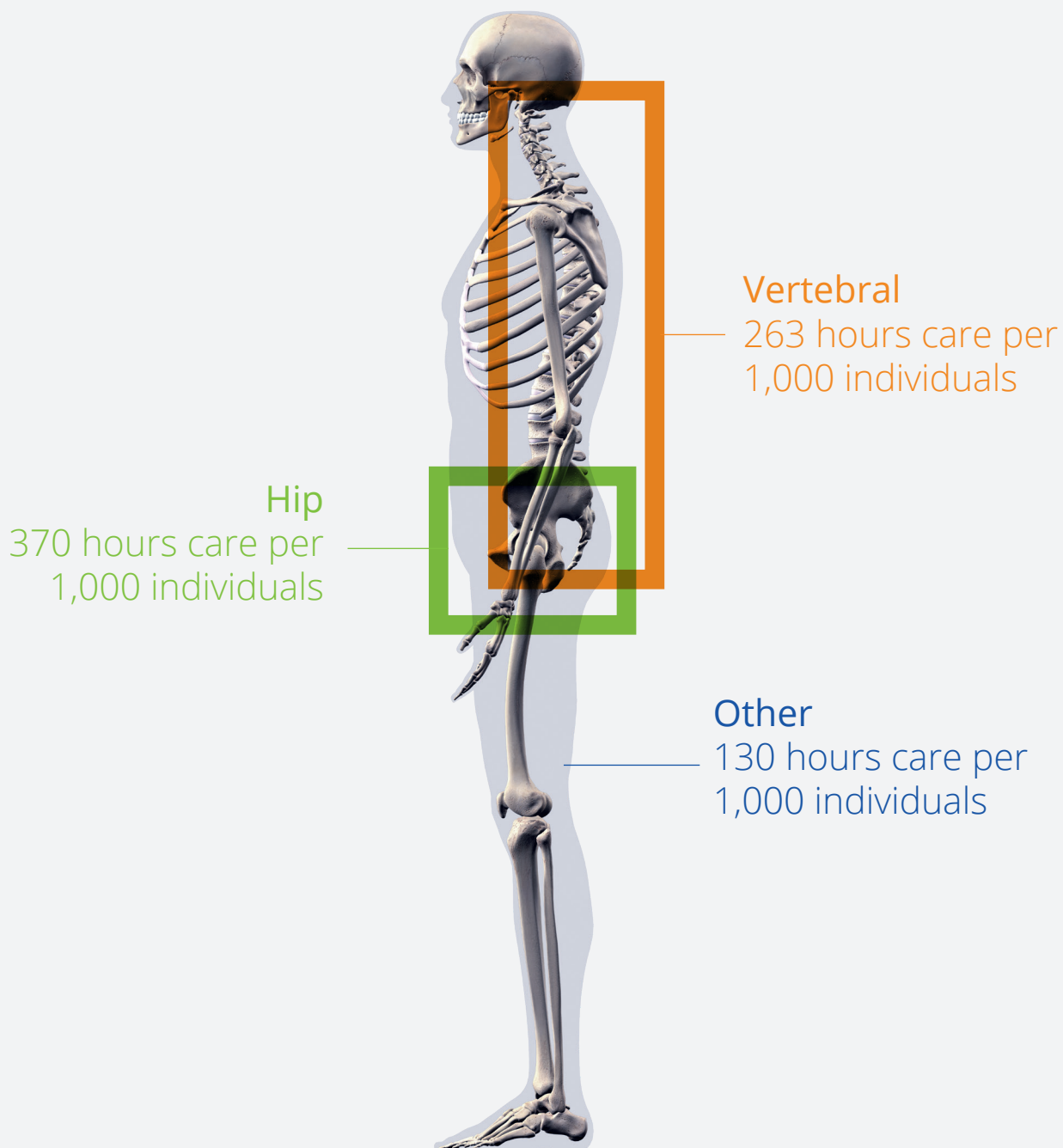
Average sick days taken after fragility fracture per 1,000 people, by EU6 country



Patients suffering fragility fractures depend on care from family and friends

As a result of reduced mobility and ability to complete activities of daily living, individuals who have suffered a fragility fracture may rely on informal caregivers, such as family members or friends.

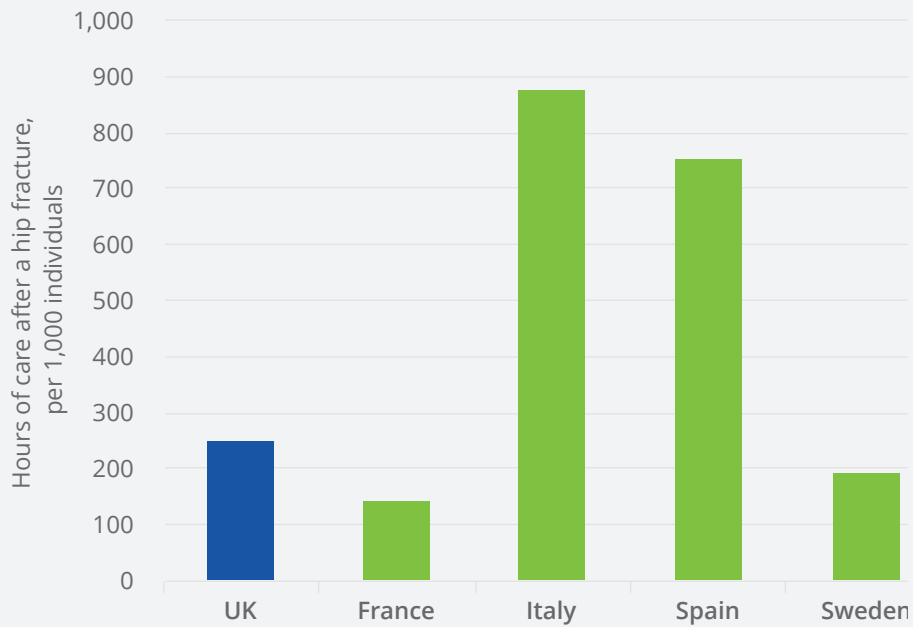
During the first year after a fracture, the hours of care provided by relatives vary greatly by fracture type and country:^{*6} **The more serious the fracture, the more support is needed.**



^{*}To measure the average burden placed on informal caregivers per year, survey responses from ICUROS²⁹⁻³¹ were also used to determine the caregiver burden due to osteoporotic fracture. It was measured in terms of hours of care per year provided by relatives in ICUROS Europe (a substitute measure for the EU6), as well as selected countries.

In countries where cross-generational support is more established, the impact of fragility fractures on caregivers is generally higher.³²

Relative care hours related to hip fractures per 1,000 people, by country



FRAGILITY FRACTURES IN THE CONTEXT OF PUBLIC HEALTH PRIORITIES



My bones became worse and I suffered a further three fractures in my vertebrae, which has had a life changing colossal impact on my life.

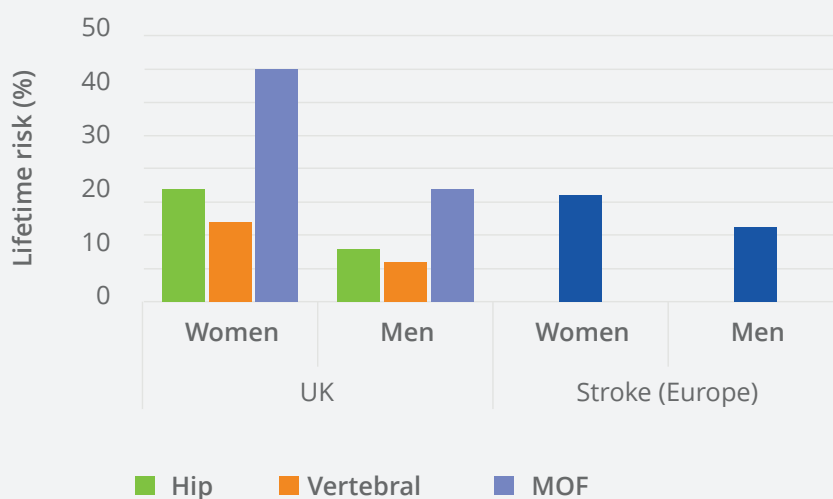
Clive, UK



Fragility fractures represent a health risk for individuals aged 50 or above. In these older individuals, **the risk of being affected by osteoporosis is similar to that of having high cholesterol or blood pressure** (two major contributors to heart disease that affect 54% and 44% of people aged 50 or above, respectively).³³

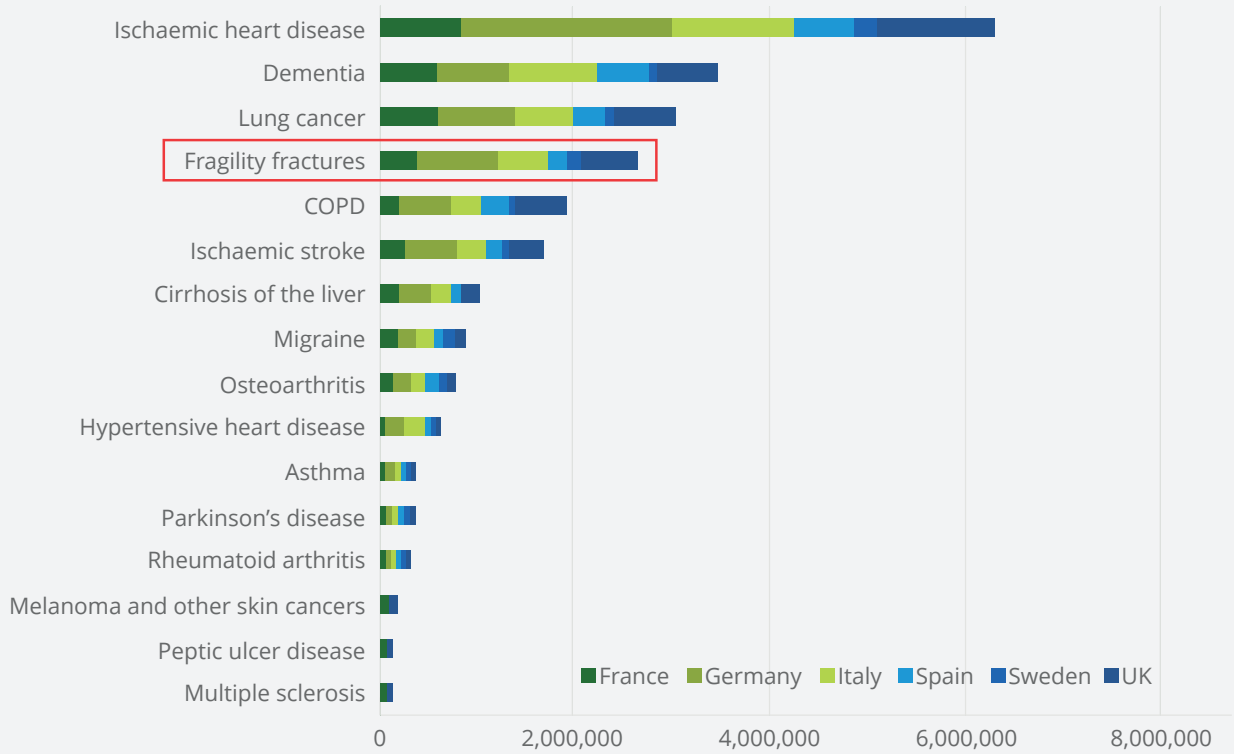
The lifetime risk of suffering a MOF at age 50 years in the UK (35% for women; 31% for men)⁷ is **markedly higher than the lifetime risk of a stroke** for women (20%) and men (14%) in Europe.^{34,35}

Lifetime risk of fragility fracture from the age of 50 years in the UK and the equivalent risk of stroke in Europe ^{2,7,12,14-20}



The fragility fracture burden in the EU6 is greater than that of many other chronic diseases (including COPD). It is surpassed only by ischaemic heart disease, dementia and lung cancer.³⁶

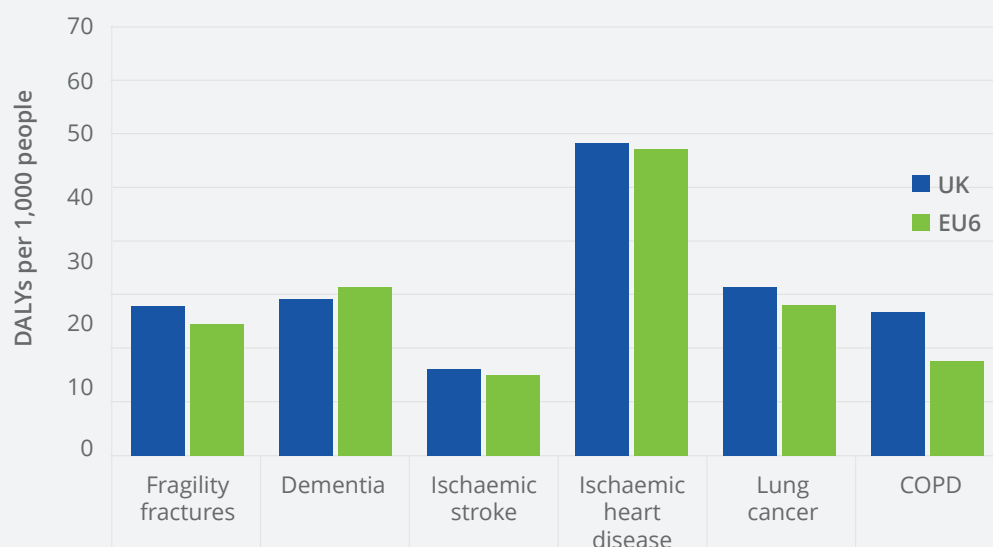
Country contribution to total disability-adjusted life years (DALYs) by disease in the EU6 in 17 selected diseases



Osteoporosis is the fourth leading cause of chronic disease morbidity, rising from a ranking of sixth in 2009. Across the EU6, fragility fractures now account for more than 2.6 million DALYs (a measure of the impact of a disease or injury in terms of healthy years lost²³) annually, more than for hypertensive heart disease or rheumatoid arthritis.⁷

In the UK, an estimated 24 DALYs are lost per 1,000 individuals aged over 50 years due to fragility fractures. The UK burden exceeds the EU6 average (21 DALYs per 1,000 people) and that associated with other major chronic diseases of ageing (ischaemic stroke and COPD):³⁶

DALYs per 1,000 people (aged over 50 years) by disease in the UK and the EU6³⁶





FRAGILITY FRACTURES ARE A GROWING CHALLENGE IN THE PUBLIC HEALTH LANDSCAPE



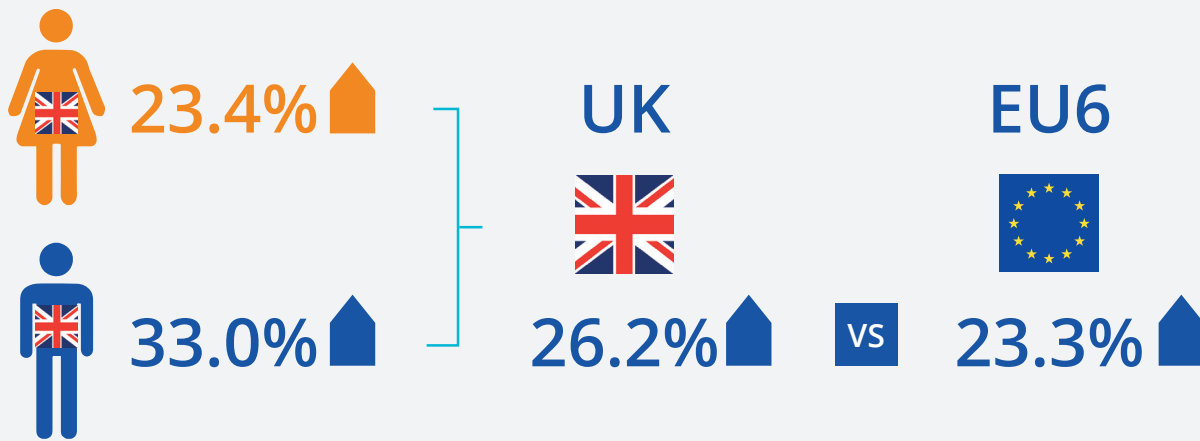
It's the everyday things that make me so frustrated, getting into and out of the shower is impossible. Some days I could just scream with the pain.

Jane, UK

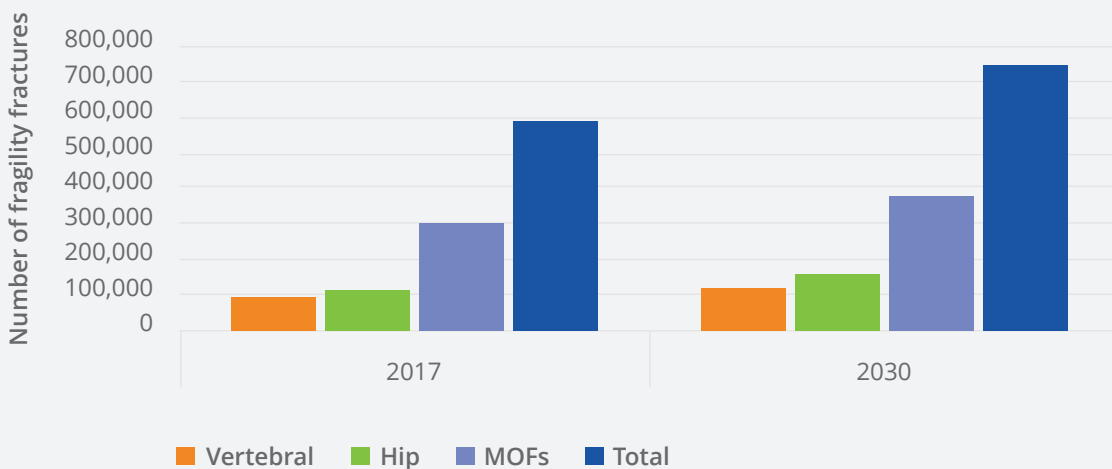


An ever-growing public health challenge is emerging: 520,000 fragility fractures occurred in the UK in 2017, and the annual incidence is estimated to increase to 660,000 by 2030.⁶

The projected increase in fracture incidence in the UK (26.2%) is mirrored across the EU6 (23.3%):⁶

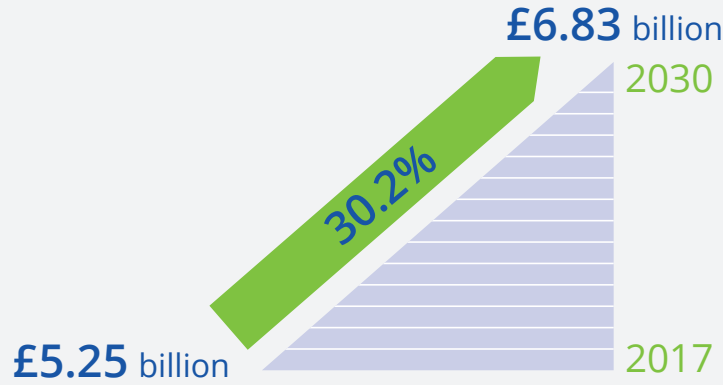


Estimated number of fragility fractures by fracture category in the UK in 2017 and 2030

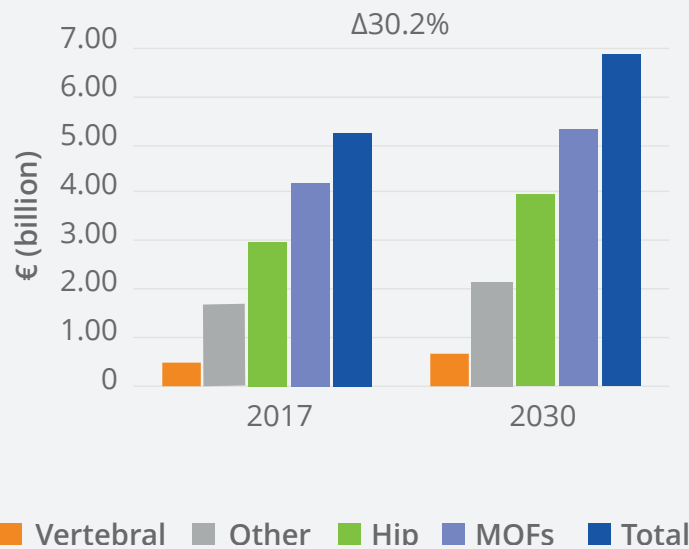


Fracture-related costs are set to rise

Fracture-related costs in the UK are projected to increase by almost one-third between 2017 and 2030.⁶ The projected increase in fracture costs in the UK over this period exceeds the overall average of 27.7% for the EU6 nations.⁶



Estimated annual fracture-related costs in 2017 and 2030, and percentage change for the UK



Δ percentage change for all fragility fractures

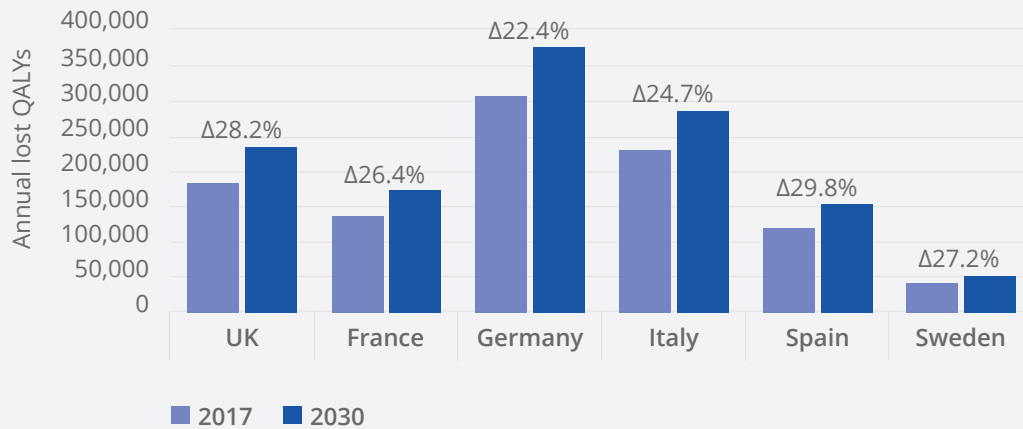


Although hip fractures make up **1/5** of total fractures, they are estimated to incur an estimated **58%** of total fracture-related costs

Fracture-related patient burden is set to increase

Based on population projections, the QALY losses associated with fragility fractures will increase between 2017 and 2030 across the EU6, with the UK facing the greatest percentage increase over the time period (28.2%).⁶

Total annual loss of QALYs by country in 2017 and 2030, and percentage change



Δ percentage change for all fragility fractures



EFFECTIVE MANAGEMENT CAN IMPROVE OUTCOMES AND REDUCE COSTS



If the fracture I suffered in my spine had been spotted earlier than it was, I would have been spared a great deal of pain and suffering.

Christine, UK



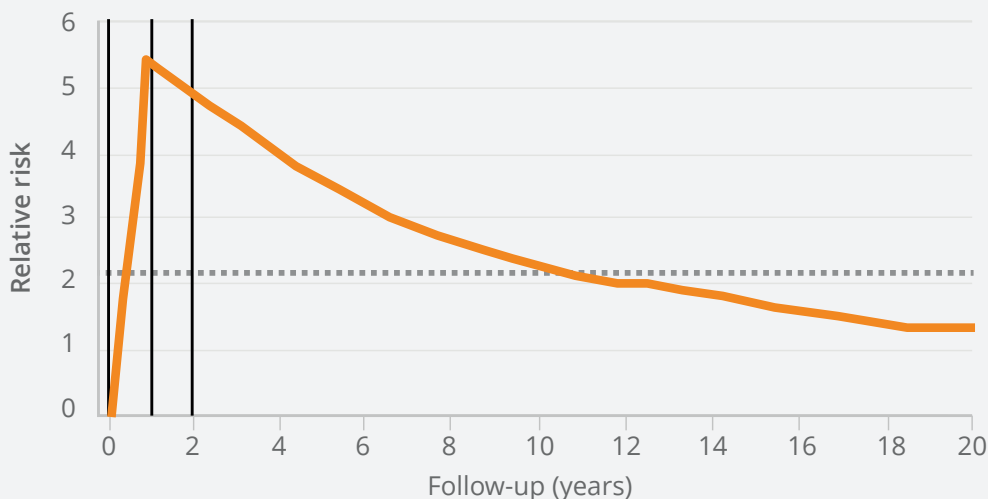
One fragility fracture leads to another

For women aged 50 to 80, after their first fragility fracture, their risk of a subsequent fracture within the first year after a fracture is **five times greater** than women who have not had a prior fracture.³⁷

Subsequent fracture risk is highest in the first 2 years following an initial fracture, when there is an **imminent risk** of another fracture at the same, or other, sites.³⁸ This is why it is critically important to identify patients as soon as possible after fracture to optimise fracture prevention treatments and keep the patient from having another fracture.

Similar patterns of imminent fracture risk have been observed in most countries evaluated,^{21,22} but between-country comparisons are limited by data availability.

Relative risk of all subsequent fractures calculated as a mean from the first fracture (grey line) and per separate year of follow-up (orange line)



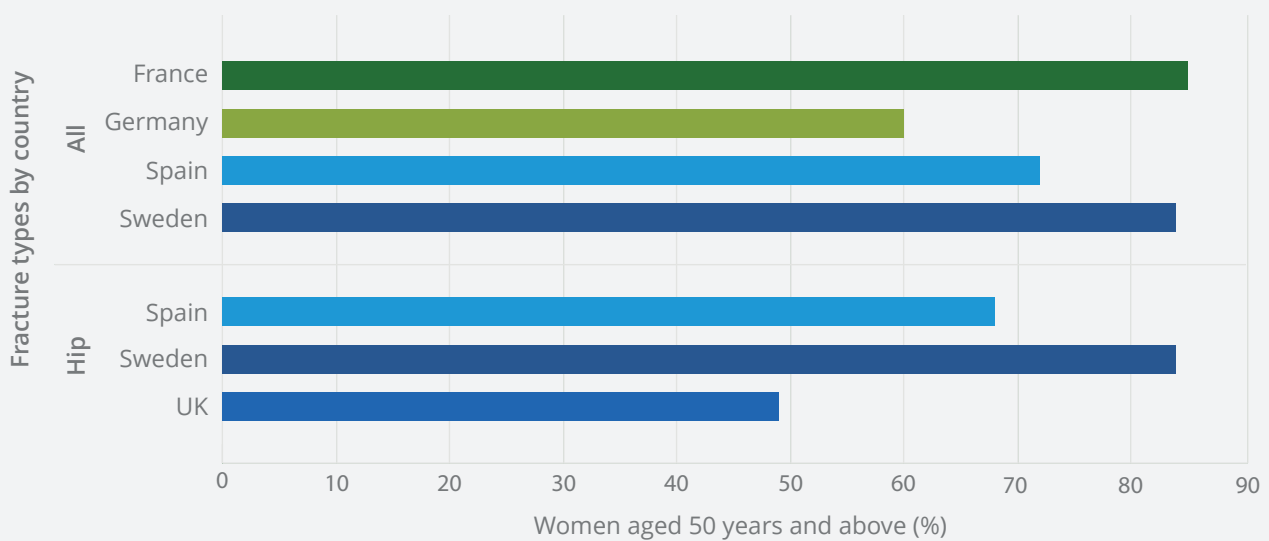
Adapted from van Geel *et al.*³⁷

Most eligible patients do not receive treatment to prevent fragility fractures following their first fracture

With appropriate medical treatment, many fragility fractures can be avoided. The guidelines recommend that all patients should receive treatment after suffering a fragility fracture.³⁹⁻⁴¹ Unfortunately this is not always the case with **60-85% of women across the EU6 not receiving treatment following a fracture** and more than 50% of UK women aged 50 or above who sustain a hip fracture not being prescribed pharmacological treatment for osteoporosis in the following year.⁶

In the UK, the treatment gap was markedly lower after hip fracture (49%).⁶

Proportion (%) of female patients (50 years and above) untreated within a year of osteoporotic fracture^{6,42,43}



Multidisciplinary models for secondary fracture prevention can contribute to closing the treatment gap

Post-fracture coordinated care models, such as a Fracture Liaison Service (FLS), are multidisciplinary healthcare delivery models for secondary fracture prevention. Systematically, they aim to identify, diagnose and treat (by referral) all eligible patients within a local population who have suffered a fragility fracture, with the aim of reducing risk of subsequent fractures. In the FLS model, care is usually coordinated by a dedicated, specialist nurse who helps patients navigate the way through the various departments of relevance (e.g. orthopaedic surgery, radiology and primary care). The FLS concept was first developed and implemented in Scotland and has grown in popularity around the world due to its effectiveness in preventing secondary fractures.⁴⁴

Post-fracture coordinated care models, like FLSs, offer the potential for a **cost-effective care delivery model** that reduces the risk of re-fracture and mortality by increasing the number of patients being treated and improving adherence to treatment.^{5,44-50} Data published from the FLS in Glasgow, Scotland, showed that FLSs are cost-effective for the prevention of further fractures in fragility fracture patients, resulting in fewer fractures and cost savings for healthcare systems.^{5,47}

A recently published systematic literature review and meta-analysis based on 159 scientific publications highlighted the benefits of FLSs:⁵¹

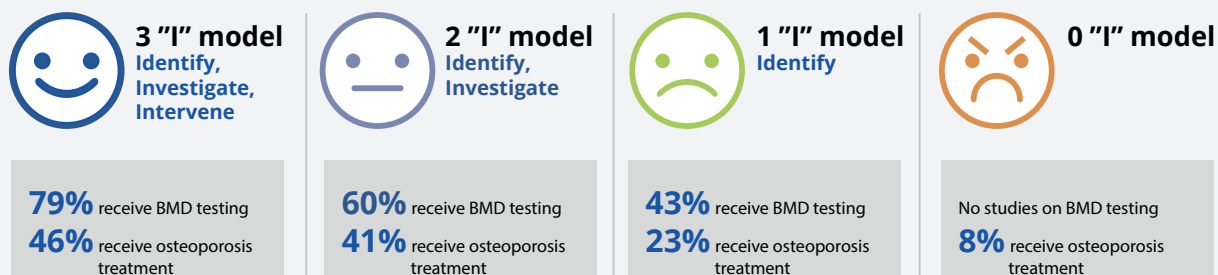
Outcome measure ⁵¹	Effect of FLS (absolute change)	95% CI	Duration of follow-up (months)	Number of studies included
BMD testing	+24%	0.18 to 0.29	3-26	37
Treatment initiation	+20%	0.16 to 0.25	3-72	46
Treatment adherence	+22%	0.13 to 0.31	3-48	9
Re-fracture rate	-5%	-0.08 to -0.03	6-72	11
Mortality	-3%	-0.05 to -0.01	6-72	15

BMD, Bone Mineral Density

However, not all FLSs are the same between and within countries. FLSs vary in the services they offer, from identifying and informing patients without taking further action, to more comprehensive models that include investigating, treating and monitoring patients. This variation in structure affects the level of impact on health outcomes.⁵⁰

The effect of different models of care on osteoporosis treatment and frequency of BMD testing were evaluated in a meta-analysis by Ganda *et al.*⁵²

A meta-analysis demonstrated that adoption of the 3 "I" model, with core priorities of Identify, Investigate and Intervene, offered greater effectiveness in patient assessment and treatment than 0-2 "I" models



Adapted from Ganda *et al.*⁵²

The analyses by both Ganda *et al.* and Wu *et al.* showed **dramatic increases in BMD testing and osteoporosis treatment initiation**, which further supports the value of post-fracture care coordination to prevent fragility fractures and reduce the overall cost of care for these patients.^{51,52}

Data from the UK's established FLSs, indicate that:

- During the first 10 years of its existence, the FLS of the Glasgow University teaching hospitals assessed 50,000 patients and contributed to a 7.3% reduction in hip fracture rates, compared with a parallel increase of 17% in England⁵
- A Glasgow-style FLS could be implemented across the UK for as little as 0.6% of the current annual hip fracture costs⁵³

Capture The Fracture® (CTF®): A global initiative of IOF

CTF® aims to 'facilitate the implementation of coordinated, multidisciplinary models of care for secondary fracture prevention'.

CTF® has created a set of internationally endorsed standards and guides for best practice to bridge the gap between FLS providers and to help in the development and implementation of new FLSs. CTF® includes the largest network of individual FLS providers in the world.

Providers undergo a CTF® audit to determine service quality, with a gold, silver or bronze star awarded.

There are huge variations between and within countries in terms of the availability of coordinated care models. A CTF® survey reported that such models only existed for 2.8% of responders in Italy and up to 37.5% of responders in Sweden for hospital referrals, reducing to 1-10% for general practitioner referrals. In contrast, in the UK, the NOS estimated that 55% of the UK population has access to an FLS.

FLSs are a cost-effective option for patient management

In the UK, all relevant professional organisations⁵⁴, the National Osteoporosis Society⁵⁵ and policymakers^{56,57} have recognised the need for universal access to FLSs. The National Osteoporosis Society has developed **core standards that every FLS should meet to ensure that correct identification, investigation, information, intervention and integration with primary care are achieved**, within a framework of quality, to the long-term benefit of fracture patients – the **5IQ approach**. By adopting these standards, evidence-based best practice can be replicated effectively across the UK to reduce the burden of fractures while improving outcomes for patients and ensuring appropriate use of NHS resources.

In the UK, the cost per QALY of improving patient outcomes within an FLS has been estimated to be:⁵⁸

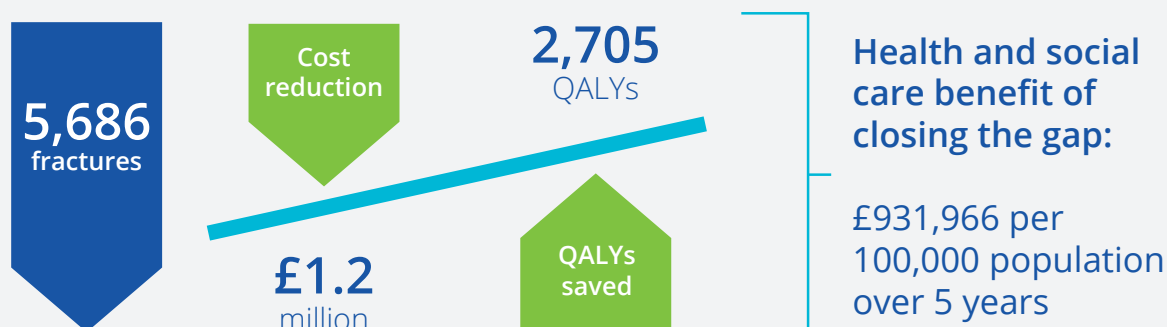


£22,709–30,000
per QALY saved;
ICER post-hip fracture

ICER, incremental cost-effectiveness ratio (a statistic used to summarise the cost-effectiveness of a healthcare intervention)

The NOS estimates that 55% of the UK population currently has access to an FLS. A recent health economic analysis suggested that up-scaling FLS provision to cover all individuals aged over 50 years in the UK could prevent an estimated 5,686 subsequent fragility fractures every year and achieve net cost savings of £1.2 million a year:⁶

Cost implications of extending an FLS to all individuals over 50 years in the UK



The World Health Organization⁵⁹ provides guidance on how an intervention with a benefit expressed in QALY value equivalent to 1 year's gross domestic product (GDP) per capita or less is considered to be reasonable expenditure, representing the likelihood of achieving at least 1 additional year of healthy life per capita.

With the UK GDP estimated to be £39,000–40,000,⁶⁰ FLSs not only offer **clear cost-effectiveness and cost savings for the NHS**, but also the possibility of improved care for the UK population.

A ROADMAP TO SOLVE THE FRAGILITY FRACTURE CRISIS IN THE UK



Believe me when I say living with these fractures is a nightmare that never goes away.

Christine, UK



The NOS and the osteoporosis community acknowledges that due to the devolution of powers to Scotland, Wales and Northern Ireland legislatures and administrations there is national variation. However, this policy roadmap is aimed at national and local governments involved in health and social care policy making, health and social care commissioners, health and social care providers, professional bodies, drug companies and treatment/intervention provider decision makers, researchers and academics, and in fact to any innovators who are bold, brave and curious to want to make a difference to the lives of people with osteoporosis and the improvement of bone health in the UK.

Strengthen national policy

- Influence national and local government to direct future policies by prioritising the effective reduction of- the burden from fragility fractures
- Influence organisations and individuals working with at risk groups and long-term conditions
- Have a clear evidence base for the prevention of osteoporosis, falls reduction and promotion of bone health and healthy ageing
- Establish consensus positions on the benefits of calcium intake, vitamin D status and physical activity for bone health and falls reduction and, through these, work towards improvements in national levels of vitamin D and participation in weight-bearing and muscle strengthening activities
- Include bone health messages in national public health prevention campaigns so that bone mass is maximised during early life and adulthood, and premature bone loss is minimised so that everybody has the best possible bone health throughout the course of their life
- Implement high-quality, sustainable, commissioning practices that will ensure FLSs are developed specifically to deliver nationally recognised standards and ongoing service improvement
- Develop and maintain a national audit of fragility fractures in England, Northern Ireland, Scotland and Wales at hospital and patient level
- Through the provision of data, improve the evidence-based service improvement for effective delivery of fracture prevention services and ensure sustainability of services
- Work in collaboration with NHS England and improvement initiatives and partners (NHS RightCare, GIRFT) to ensure that evidence and best practice is communicated and shared across all localities to inform commissioning decisions
- Routinely collect data on the mode of fracture, i.e. low trauma/fragility fracture as part of the standard NHS dataset across the UK
- Scope and develop plans to screen people at risk of osteoporosis
- Work to make osteoporosis a key part of improving health outcomes for the nation

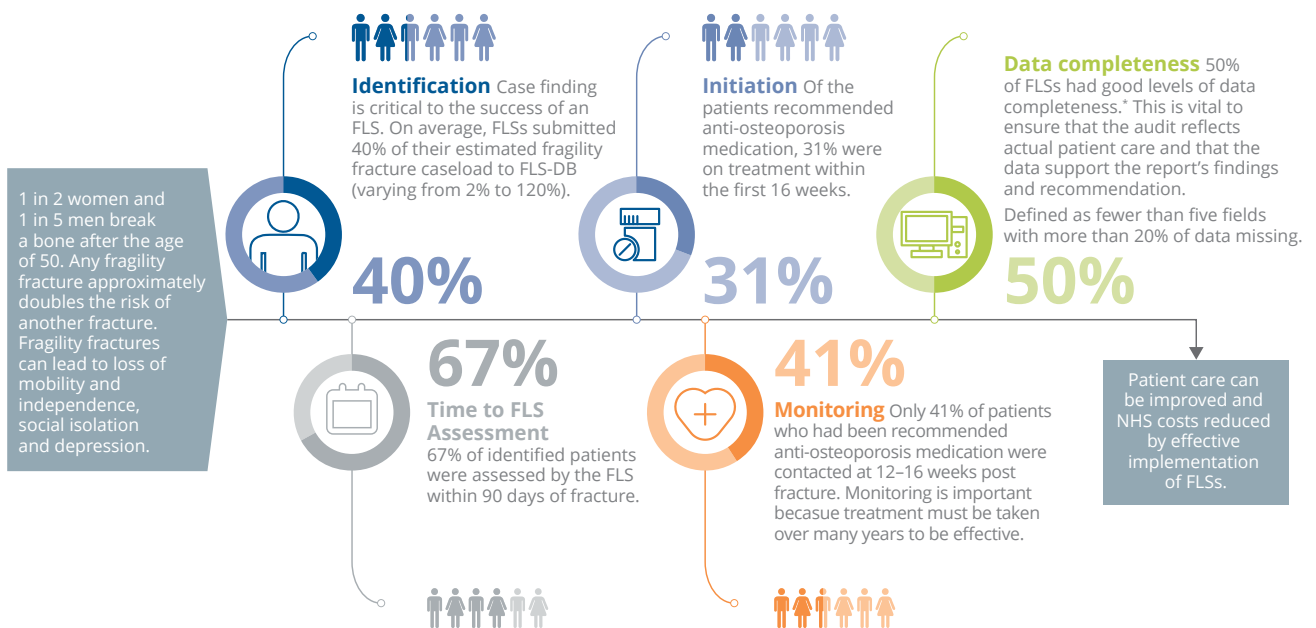
Improve local services

- Involve people with osteoporosis, their family and carers, in co-creation and improvement of health and social care services as part of wider patient/public involvement and engagement practices
- Make people with osteoporosis and their families aware of how to gain maximum benefit from their health and social care services
- Commission, develop and support local osteoporosis and FLSs to ensure there is total UK population access to effective fracture prevention services, with specific focus on the identification of vertebral fractures
- Improve working across the interface of primary and secondary care
- Continuously improve the effectiveness, efficiency and patient experience of services against national guidance/standards, standards and audits (e.g. FLS Database, FLS-DB)
- Improve commissioning, management of data recording for FLSs and integrated falls services
- Provide high-quality, accredited education and support for healthcare professionals, policy makers and the public to help raise awareness of the importance of good bone health and fracture prevention

FLS-DB patient-level audit

Building on the success of the audit in driving quality of care for patients with a hip fracture,⁶¹ the Health Quality Improvement Partnership funded a mandatory national FLS-DB audit that was launched in 2016 and has published three reports covering facilities and patient-level FLS outcomes.⁶²⁻⁶⁴ The audit allows FLSs' performance to be benchmarked and reported to payers, and for key service components to be identified and prioritised for service improvement and impact on patient care.

Performance of 50 FLSs supporting 42,589 patients with a fragility fracture in 2016⁵⁹



Raise awareness – change behaviour

- Increase awareness and understanding of how and why to improve bone health so that people are motivated to change behaviour
- Increase access and participation in safe physical activity or exercise
- Empower those with osteoporosis, their friends, family and social networks to be advocates for change
- Ensure people know what good quality services look like and what to expect from their health and social care providers and demand it
- Ensure people with osteoporosis and their families and carers feel supported, and are empowered and motivated to live well despite the symptoms of osteoporosis and that they understand how to prevent future fractures so they can manage their condition optimally
- Work towards including mental wellbeing as a key element of care and support as the psychological effects of osteoporosis are recognised more
- Raise awareness of healthy diets that include adequate calcium to aid bone health
- The families and carers of people with osteoporosis need to be more aware of osteoporosis and its risk factors and be encouraged to seek out a diagnosis
- Encourage healthcare professionals and NHS managers to follow up-to-date evidence-based guidance on standards of osteoporosis care and FLS
- Ensure that FLS commissioning incorporates service improvement and participation in national patient-level audits as basic standards and requirements

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REFERENCE LIST

1. NOF. What is osteoporosis? Available at: <https://www.nof.org/patients/what-is-osteoporosis/osteopedia-2/>. Last accessed August 2018.
2. Kanis J, Johnell O, Oden A, *et al*. Long-term risk of osteoporotic fracture in Malmö. *Osteoporos Int* 2000;11:669–74.
3. IOF. Facts and statistics. Available at: <https://www.iofbonehealth.org/facts-statistics#category-14>. Last accessed August 2018.
4. Lems WF, Dreinhöfer KE, Bischoff-Ferrari H, *et al*. EULAR/EFORT recommendations for management of patients older than 50 years with a fragility fracture and prevention of subsequent fractures. *Ann Rheum Dis* 2017;76:802–10.
5. IOF. Capture the Fracture. Available at: <http://capturethefracture.org/post-fracture-care-gap>. Last accessed August 2018.
6. Data on file. 2018. Fragility Fractures in the UK. Burden, management and opportunities: EU6 Summary Final Report 2018-06-26.
7. Hernlund E, Svedbom A, Ivergård M, *et al*. Osteoporosis in the European Union: medical management, epidemiology and economic burden. A report prepared in collaboration with the International Osteoporosis Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA). *Arch Osteoporos* 2013;8:136.
8. Kanis JA, Johnell O, Oden A, Jonsson B, De Laet C, Dawson A. Risk of hip fracture according to the World Health Organization criteria for osteopenia and osteoporosis. *Bone* 2000;27:585–90.
9. Looker AC, Wahner HW, Dunn WL, *et al*. Updated data on proximal femur bone mineral levels of US adults. *Osteoporos Int* 1998;8:468–89.
10. Strom O, Borgstrom F, Kanis JA, *et al*. Osteoporosis: burden, health care provision and opportunities in the EU: a report prepared in collaboration with the International Osteoporosis Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA). *Arch Osteoporos* 2011;6:59–155.
11. United Nations DESA/Population Division. World Population Prospects. 2017. Available at: <https://esa.un.org/unpd/wpp/Download/Standard/Population/>. Last accessed August 2018.
12. Pisani P, Renna MD, Conversano F, *et al*. Major osteoporotic fragility fractures: Risk factor updates and societal impact. *World J Orthop* 2016;7:171.
13. Jakobsen A, Laurberg P, Vestergaard P, Andersen S. Clinical risk factors for osteoporosis are common among elderly people in Nuuk, Greenland. *Int J Circumpolar Health* 2013;72:19596.
14. Icks A, Haastert B, Wildner M, Becker C, Meyer G. Trend of hip fracture incidence in Germany 1995–2004: a population-based study. *Osteoporos Int* 2008;19:1139–45.
15. Diez A, Puig J, Martínez MT, Diez JL, Aubia J, Vivancos J. Epidemiology of fractures of the proximal femur associated with osteoporosis in Barcelona, Spain. *Calcif Tiss Int* 1989;44:382–6.
16. Elffors I, Allander E, Kanis J, *et al*. The variable incidence of hip fracture in southern Europe: the MEDOS Study. *Osteoporos Int* 1994;4:253–63.
17. Piscitelli P, Chitano G, Johannson H, Brandi ML, Kanis JA, Black D. Updated fracture incidence rates for the Italian version of FRAX®. *Osteoporos Int* 2013;24:859–66.
18. Izquierdo MS, Ochoa CS, Sánchez IB, Hidalgo MP, del Valle Lozano F, Martín TG. Epidemiology of osteoporotic hip fractures in the province of Zamora (1993). *Revista española de salud pública* 1997;71:357–67.
19. Sosa M, Segarra M, Hernández D, González A, Limiñana J, Betancor P. Epidemiology of proximal femoral fracture in Gran Canaria (Canary Islands). *Age Ageing* 1993;22:285–88.
20. Curtis EM, van der Velde R, Moon RJ, *et al*. Epidemiology of fractures in the United Kingdom 1988–2012: Variation with age, sex, geography, ethnicity and socioeconomic status. *Bone* 2016;87:19–26.
21. Roux C, Briot K. Imminent fracture risk. *Osteoporos Int* 2017;28:1765–9.

22. Bonafede M, Shi N, Barron R, Li X, Crittenden DB, Chandler D. Predicting imminent risk for fracture in patients aged 50 or older with osteoporosis using US claims data. *Arch Osteoporos* 2016;11:26.
23. National Institute for Health and Care Excellence. Glossary. Available at: <https://www.nice.org.uk/glossary>. Last accessed August 2018.
24. National Osteoporosis Society. Living with Osteoporosis. Available at: <https://nos.org.uk/about-osteoporosis/living-with-osteoporosis/>. Last accessed August 2018.
25. National Osteoporosis Society. Life with Osteoporosis: the untold story. Available at: <https://nos.org.uk/media/1859/life-with-osteoporosis.pdf>. Last accessed August 2018.
26. McKercher HG, Crilly RG, Klooseck M. Osteoporosis management in long-term care. *Survey of Ontario physicians. Canadian Family Physician Medecin de Famille Canadien* 2000;46:2228–35.
27. RCP Falls and Fragility Fracture Audit Programme. Available at: <https://www.rcplondon.ac.uk/projects/falls-and-fragility-fracture-audit-programme-fffap>. Last accessed August 2018.
28. Data on file. 2018. Fragility Fractures in Europe. Burden, management and opportunities: EU6 Summary Final Report 2018-06-26.
29. Borgstrom F, Lekander I, Ivergard M, *et al*. The International Costs and Utilities Related to Osteoporotic Fractures Study (ICUROS) – quality of life during the first 4 months after fracture. *Osteoporos Int* 2013;24:811–23.
30. Svedbom A, Borgstrom F, Hernlund E, *et al*. Quality of life after hip, vertebral, and distal forearm fragility fractures measured using the EQ-5D-3L, EQVAS, and time-trade-off: results from the ICUROS. *Qual Life Res* 2017;27:707–16.
31. Svedbom A, Borgstrom F, Hernlund E, *et al*. Quality of life for up to 18 months after low-energy hip, vertebral, and distal forearm fractures-results from the ICUROS. *Osteoporos Int* 2018;29:557–66.
32. Eurocarers. The Situation of Carers in the EU. Available at: <http://www.eurocarers.org/userfiles/files/factsheets/Eurocarers%20Situation%20of%20carers%20in%20EU.pdf>. Last accessed August 2018.
33. Wolf-Maier K, Cooper RS, Banegas JR, *et al*. Hypertension prevalence and blood pressure levels in 6 European countries, Canada, and the United States. *JAMA* 2003;289:2363–69.
34. World Health Organization. Priority diseases and reasons for inclusion: Acute stroke. 2013. Available at: http://www.who.int/medicines/areas/priority_medicines/Ch6_6Stroke.pdf. Last accessed August 2018.
35. Hippisley-Cox J, Coupland C, Robson J, Brindle P. Derivation, validation, and evaluation of a new QRISK model to estimate lifetime risk of cardiovascular disease: cohort study using QResearch database. *BMJ* 2010;341:c6624.
36. Institute for Health Metrics and Evaluation (IHME) (2016) GBD Compare Data Visualization. <https://vizhub.healthdata.org/gbd-compare/>. Last accessed August 2018.
37. van Geel TA, van Helden S, Geusens PP, Winkens B, Dinant GJ. Clinical subsequent fractures cluster in time after first fractures. *Ann Rheum Dis* 2009;68:99–102.
38. Johansson H, Siggeirsdottir K, Harvey NC, *et al*. Imminent risk of fracture after fracture. *Osteoporos Int* 2017;28:775–80.
39. National Osteoporosis Guideline Group. NOGG 2017: clinical guideline for the prevention and treatment of osteoporosis, 23 June 2017. Available at: <https://www.guidelines.co.uk/musculoskeletal-and-joints-/nogg-osteoporosis-guideline/453250.article>. Last accessed August 2018.
40. National Institute for Health and Care Excellence. Clinical guideline CG124: Hip fracture: management. May 2017 Available at: <https://www.nice.org.uk/guidance/cg124>. Last accessed August 2018.
41. Scottish Intercollegiate Guidelines Network. Guideline 12: Management of osteoporosis and the prevention of fragility fractures. March 2015. Available at: <https://www.sign.ac.uk/sign-142-management-of-osteoporosis-and-the-prevention-of-fragility-fractures.html?UNLID=>. Last accessed August 2018.
42. l'Assurance Maladie. Améliorer la qualité du système de santé et maîtriser les dépenses. Propositions de l'Assurance Maladie pour 2016, 2016 edn.
43. Klop C, Gibson-Smith D, Elders PJ, *et al*. Anti-osteoporosis drug prescribing after hip fracture in the UK: 2000–2010. *Osteoporos Int* 2015;26:1919–28.
44. Mitchell PJ. Fracture Liaison Services: the UK experience. *Osteoporos Int* 2011;22(Suppl. 3):487–94.

45. Eekman DA, van Helden SH, Huisman AM, *et al.* Optimizing fracture prevention: the fracture liaison service, an observational study. *Osteoporos Int* 2004;25:701–9.
46. Huntjens KM, van Geel TA, van den Bergh JP, *et al.* Fracture liaison service: impact on subsequent nonvertebral fracture incidence and mortality. *J Bone Joint Surg Am* 2014;96:e29.
47. McLellan AR, Wolowacz SE, Zimovetz EA, *et al.* Fracture liaison services for the evaluation and management of patients with osteoporotic fracture: a cost-effectiveness evaluation based on data collected over 8 years of service provision. *Osteoporos Int* 2011;22:2083–98.
48. Nakayama A, Major G, Holliday E, *et al.* Evidence of effectiveness of a fracture liaison service to reduce the re-fracture rate. *Osteoporos Int* 2016;27:873–9.
49. Schray D, Neuerburg C, Stein J, *et al.* Value of a coordinated management of osteoporosis via Fracture Liaison Service for the treatment of orthogeriatric patients. *Eur J Trauma Emerg Surg* 2016;42:559–64.
50. Walters S, Khan T, Ong T, Sahota O. Fracture liaison services: improving outcomes for patients with osteoporosis. *Clin Interv Aging* 2017;12:117–27.
51. Wu CH, Tu ST, Chang YF, *et al.* Fracture liaison services improve outcomes of patients with osteoporosis-related fractures: A systematic literature review and meta-analysis. *Bone* 2018;111:92–100.
52. Ganda K, Puech M, Chen JS, *et al.* Models of care for the secondary prevention of osteoporotic fractures: a systematic review and meta-analysis. *Osteoporos Int* 2013;24:393–406.
53. IOF. Capture the Fracture: Health Economics. Available at: <http://capturethefracture.org/health-economics>. Last accessed August 2018.
54. British Orthopaedic Association/British Geriatric Society. The Care of Patients with Fragility Fracture. London: British Orthopaedic Association. 2007.
55. National Osteoporosis Society. 25th anniversary report – A fragile future. 2011.
56. HC Deb. [Parliamentary Written Answer]. 17th November 2014. 213484W.
57. HC Deb. [Parliamentary Written Answer]. 11th February 2015. 223302W.
58. Leal J, Gray AM, Hawley S, *et al.* Cost-effectiveness of orthogeriatric and fracture liaison service models of care for hip fracture patients: a population-based study. *J Bone Miner Res* 2017;32:203–11.
59. Bertram MY, Lauer JA, Joncheere Kees De, *et al.* Cost-effectiveness thresholds: pros and cons. *Bull World Health Organ* 2016;94:92–30.
60. Trading Economics. GDP per capita | Europe. Available at: <https://tradingeconomics.com/country-list/gdp-per-capita?continent=europe>. Last accessed August 2018.
61. Johansen A, Boulton C, Hertz K, *et al.* The National Hip Fracture Database (NHFD) - Using a national clinical audit to raise standards of nursing care. *Int J Orthop Trauma Nurs* 2017;26:3–6.
62. Boulton C, Gallagher C, Rai S, *et al.* Royal College of Physicians. Fracture Liaison Service Database (FLS-DB) clinical audit. FLS forward: Identifying high-quality care in the NHS for secondary fracture prevention. London: Royal College of Physicians; 2017.
63. Javaid MK, Boulton C, Gallagher C, *et al.* Fracture Liaison Service Database (FLS-DB) annual report: Leading FLS improvement: secondary fracture prevention in the NHS. In: Physicians RCO, Editor. London: Healthcare Quality Improvement Partnership; 2017.
64. Javaid MK, Rai S, Schoo R, *et al.* Fracture Liaison Service (FLS) Database facilities audit. FLS breakpoint: opportunities for improving patient care following a fragility fracture. London: Royal College of Physicians; 2016.



Our vision is a world without fragility fractures,
in which healthy mobility is a reality for all

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