BROKEN BONES, BROKEN LIVES:

A roadmap to solve the fragility fracture crisis in Sweden

IOF
International Osteoporosis Foundation

FOREWORD

With fragility fractures affecting almost one in two women and one in four men aged 50 or above in Sweden, 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 aging 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 Sweden's population ages, the incidence and contribution of fragility fractures to the overall healthcare spend continue to increase. In 2017, 120,000 fractures occurred in Sweden with an associated healthcare cost of €2 billion. This annual expenditure in Sweden is predicted to increase by nearly 30% (to €2.6 billion) by 2030.

Beyond the immediate distress, healing time, and recovery associated with a fracture, 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 programs for secondary prevention of fragility fractures.

This report, **Broken bones, broken lives: A roadmap to solve the fragility fracture crisis in Sweden**, explores the clinical, societal, and cost burdens associated with fragility fractures in Sweden. The findings provide evidence that, despite the availability of effective preventative therapies and management approaches for fragility fractures, only 17.2% of patients in Sweden receive treatment following a fracture, well below the target of 30% set by the Swedish National Board of Health and Welfare.

Secondary prevention of fragility fractures has been neglected for too long. There is an urgent need to recognize fragility fractures as a public health priority and to establish secondary fracture prevention and management as an integral component of healthy aging.

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 policymakers in offering the best possible care for Swedish citizens in order to reduce the number of fractures and their impact on patients and Sweden's healthcare system.

Cyrus Cooper, IOF President

The International Osteoporosis Foundation (IOF) is a registered not-for-profit, non-governmental foundation based in Switzerland that 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 organizations, 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, IOF is dedicated to advancing research and education, promoting policy change, increasing awareness of bone health, and improving patient care.

The Osteoporosis Association (Osteoporosförbundet) is the Swedish nationwide organization for people with osteoporosis and fragile bones, as well as for their relatives and others who have an affiliation or commitment to the disease. It was established in 1995, and operates by the voluntary efforts of its staff and its 2,500 members. The Association engages in numerous activities around disease awareness, improvement of the diagnosis and care pathway, prevention, addressing inequalities of care, and finding a cure. The association set ambitious priority goals, aspiring to a 30–40% treatment rate of osteoporosis patients, the appointment of fracture coordinators in each county council, and the availability of bone density (dual-energy X-ray absorptiometry [DXA]) scanners in each county, according to demand. The Osteoporosis Association has local chapters or points of contact throughout the country.

OSTEOPOROS FÖRBUNDET

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CONTENTS

The Swedish Osteoporosis Society (SVOS) was formed in 1987 as a platform for the exchange of experiences with the treatment of – and research into – osteoporosis. The membership of the Society consists of professionals in the field of osteoporosis. The Society disseminates information on osteoporosis to the healthcare ecosystem, to the general public, and to patients, with the aim of raising awareness and advocating for better care. The Society further publishes guidelines on fracture prevention that include the investigation and treatment of osteoporosis. SVOS organizes a variety of activities and training for doctors and healthcare professionals. In connection with the Society's annual meetings, it offers lectures on various aspects of osteoporosis and bone biology.

GLOSSARY

BMD	Bone Mineral Density
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
CTF®	Capture The Fracture®
DALY	Disability-adjusted life year
DXA	Dual-energy X-ray absorptiometry
EU6	France, Germany, Italy, Spain, Sweden, and the UK
FLS	Fracture Liaison Service
GDP	Gross domestic product
GP	General practitioner
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)
NBHW	National Board of Health and Welfare
OECD	Organisation for Economic Co-operation and Development
QALY	Quality-adjusted life year
SALAR	Swedish Association of Local Authorities
SVOS	Swedish Osteoporosis Society

EXECUTIVE SUMMARY

This report provides an overview of the burden and management of fragility fractures in Sweden 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 realize improvements in patient care.

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

With approximately **120,000 new broken bones** occurring in Sweden in 2017, fragility fractures are a major obstacle to healthy aging, impacting the independence and quality of life of **half a million women and men** living with osteoporosis in Sweden.

Fragility fractures can be prevented, but their prevention and management have long been neglected despite the massive associated costs for the Swedish healthcare system (**€2 billion in 2017**) and these are set to increase to €2.6 billion by 2030.

The burden of fragility fractures in Sweden exceeds that for chronic obstructive pulmonary disease (COPD), dementia, ischemic stroke, and lung cancer.

After a fragility fracture, individuals are **five times** more likely to experience a second fracture within the next 2 years. Despite this, only **17.2%** of patients in Sweden receive treatment following a fracture; a figure well below the target of 30% set by the Swedish National Board of Health and Welfare. Not unique to Sweden, this massive treatment gap is observed consistently across Europe, reflecting the low importance that has been given to fragility fractures to date and the current urgency to prioritize post-fracture care in our aging societies before costs get out of control.

With fragility fracture incidence in Sweden predicted to increase by almost 30% 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.

Policies have a significant role to play in promoting, funding, and implementing care solutions, such as coordinated care models for patients following a fracture, which are known as fracture chains in Sweden. The most common coordinated care model for post-fracture patients is a 'Fracture Liaison Service', or FLS. The FLS model has been proven to be clinically effective and cost-effective: reducing further fractures, and lessening the burden on both healthcare and individuals at a reasonable level of investment. Besides fracture chains, which improve patients' diagnosis, treatment, and follow-up, additional policy solutions adapted to the specificities of the Swedish healthcare system and policy landscape should also be considered.

In recognition of the growing fragility fracture burden, the national roadmap for Sweden calls for policy efforts to be focused on: closing the treatment gap, fostering the development of fracture chains, and increasing the involvement of primary care physicians in fracture prevention.

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 bump[1]
- Almost one in two women and one in four men in Sweden will experience a fragility fracture in their lifetime[2]
- 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 site[3]
- It is not only important to treat the existing fragility fracture but also to prevent subsequent ones, i.e. secondary fracture prevention[4]
- *“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]

> My daily life has changed completely. I now walk with two canes. I can’t bend down and I’m constantly in pain. I cannot carry things and therefore cannot go shopping. I miss my active life, very, very much.
>
> *Inger, Sweden*

THE SILENT BURDEN OF FRAGILITY FRACTURES FOR INDIVIDUALS AND HEALTHCARE SYSTEMS

> One of the hardest decisions I had to make was to stop working as a nurse.
>
> *Anita, Sweden*

Fragility fractures affect men and women across Sweden

Prevalence of osteoporosis in Sweden

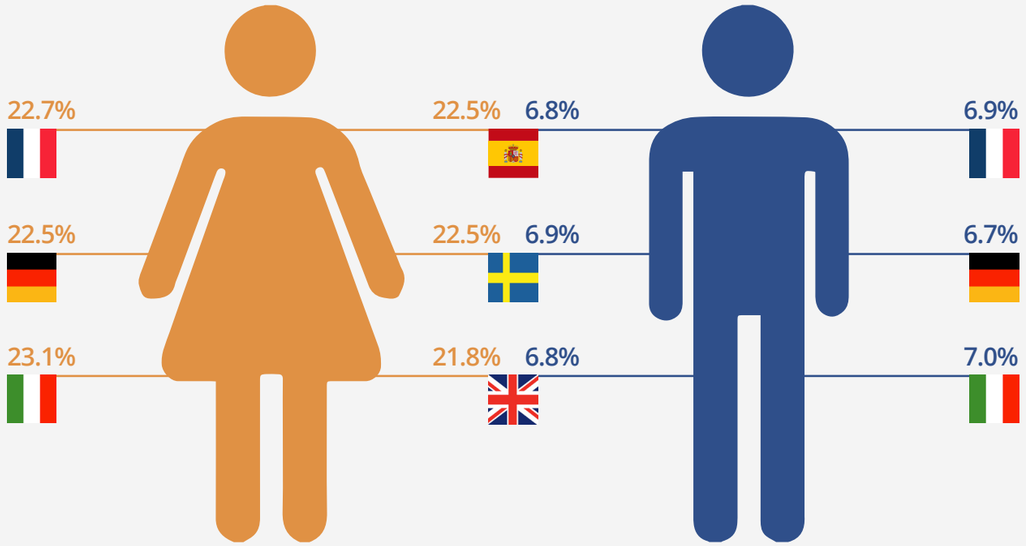
Approximately…

400,000

100,000

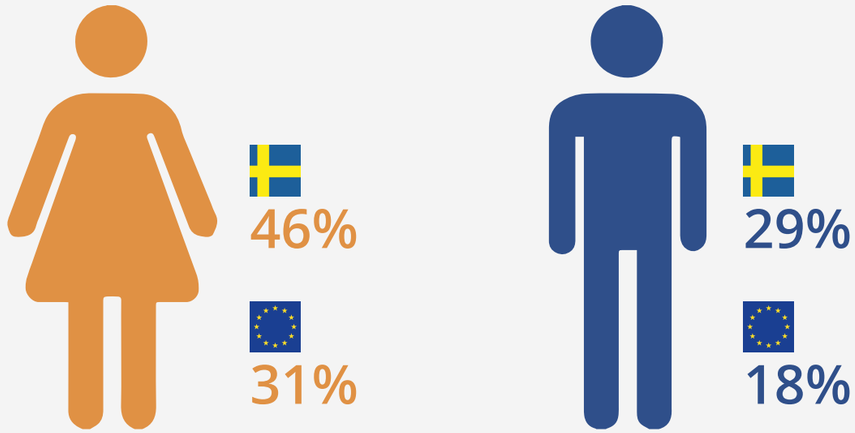
…half a million people in Sweden have osteoporosis (assessed 2015).[6]

Prevalence of osteoporosis in Sweden (22.5% for women; 6.9% for men) over the age of 50 years is comparable to that of France, Germany, Italy, Spain, and the UK, which together with Sweden 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 markedly higher for Swedish citizens than for the collective EU6 population:[7]



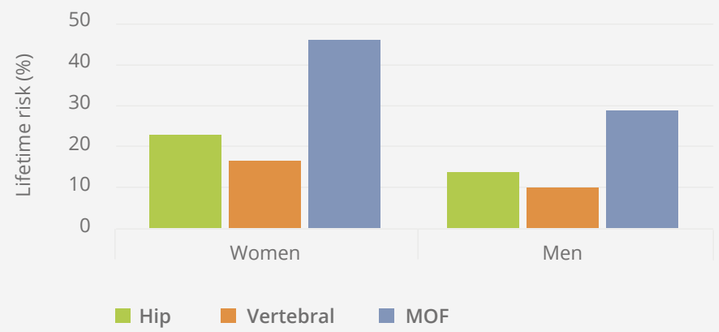
The lifetime risk of sustaining a fragility fracture varies for women and men and by fracture site.

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 are expected to increase due to an increasingly elderly population.

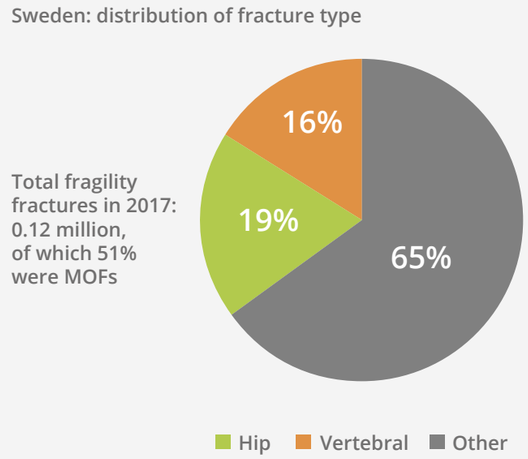
Lifetime risk of fragility fracture from the age of 50 years in Sweden[7,12,14–21]

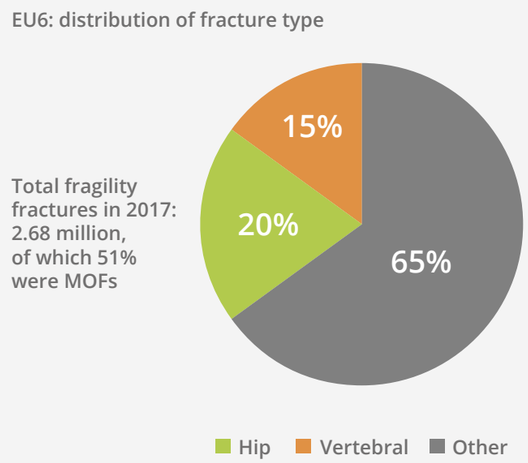


Fragility fracture incidence

An estimated 120,000 fragility fractures occurred in Sweden in 2017.[6]

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



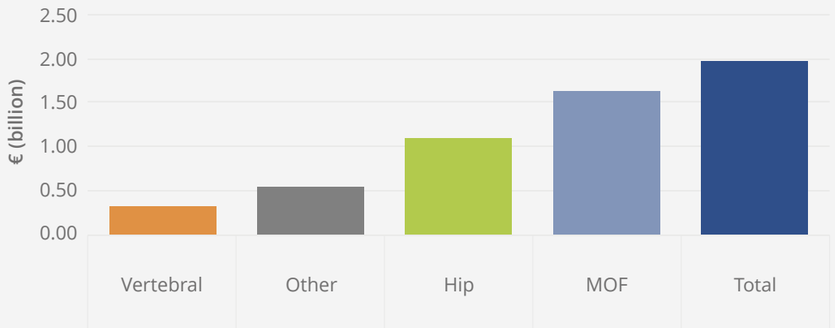


Fragility fractures incur substantial healthcare costs

Fragility fractures are associated with significant healthcare costs

In 2017, fracture-related costs totaled approximately €2.0 billion in Sweden.[6] Length of stay in secondary care following a fracture is an important driver of cost, with an estimated 450,000 hospital days in Sweden occupied by patients with fragility fractures each year, a burden exceeded only by stroke.[22] Addressing fracture-related hospital stays could not only reduce associated costs, but also free up hospital beds and reduce waiting times for patients for the treatment of other serious diseases, which is currently high on the Swedish political agenda.

Estimated annual fracture-related costs in Sweden in 2017



Fracture-related costs:[23,24]

- 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

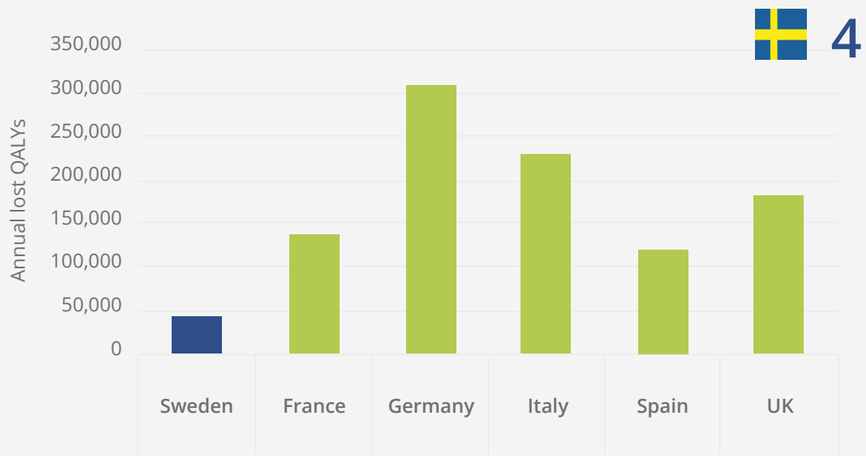
The burden of fragility fractures on individuals is demonstrated here with the annual loss of quality-adjusted life years (QALYs).

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.[25]

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 Sweden is estimated to be 41,802 QALYs; 62% of which is attributable to fractures occurring among women.[6]

Total annual loss of QALYs across the EU6 nations in 2017



Fragility fractures have a multifaceted impact on the individual and society

Reduced independence and lifestyle impairment

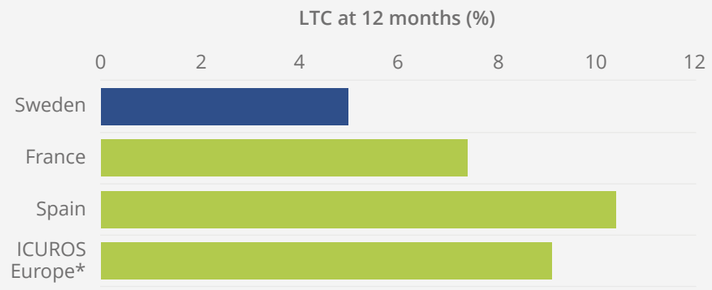
Reduced independence can be one of the most distressing outcomes for fracture patients. The disability associated with hip fractures can be severe. One year after hip fracture, 40% of patients are still unable to walk independently, and 80% are restricted in other activities, such as driving and grocery shopping.[27]

> 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.[19]

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.[28]

A large proportion of surviving patients with hip fracture are discharged to nursing homes, up to one-third for those aged younger than 80, and more than a half for those aged 80 or above. Within the first year after a hip fracture, 40% of patients are unable to walk independently, 60% require assistance with at least one essential activity of daily living (e.g. dressing, bathing, food preparation), and 80% are unable to perform at least one activity central to day-to-day life (e.g. driving, grocery shopping, house cleaning).[26,29]

Proportion of patients (%) in long-term care (LTC) at 12 months after a hip fracture, by country[6]



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

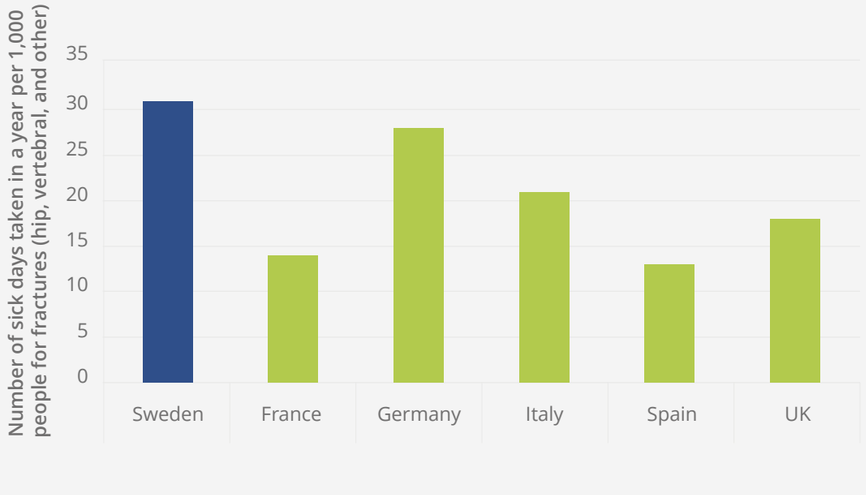
Across Europe, the proportion of patients that move into LTC within a year of sustaining a hip fracture increases with age, from 2.1% at age 50–60 years to **35.3%** above 90 years.[6]

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.[14] In 2017, a total of 1,078,370 sick days were taken in Sweden among individuals of pre-retirement age affected by fragility fractures.[30]

An average number of 31 sick days are taken per 1,000 people following a fragility fracture in Sweden; the highest estimate of any EU6 nation:[6]

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

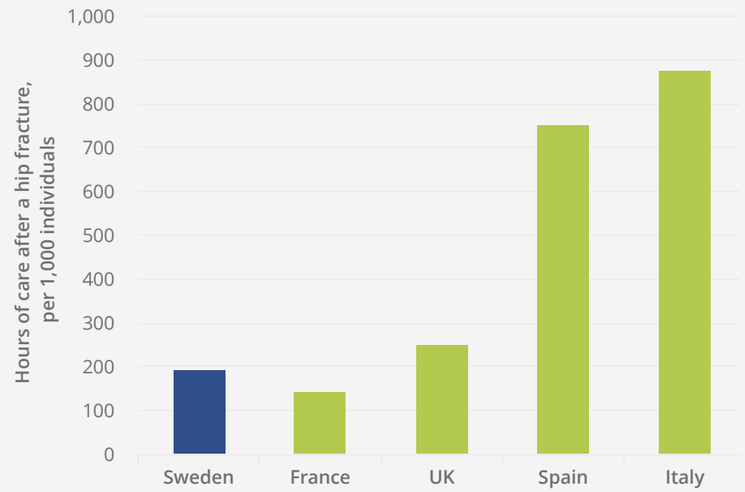
As a result of reduced mobility and ability to complete activities of daily living, individuals who have suffered a fragility fracture may rely on informal caregivers, such as family members or friends.

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 ICUROS[31–33] 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.

Sweden's health and social care policies and programs for the elderly have helped to alleviate the fracture-related care burden. Sweden has among the lowest proportions of formal (2.2%) and informal carers (8%) of any European country, which is reflected in the relatively low informal care burden associated with hip fractures compared with other EU6 countries.[34]

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

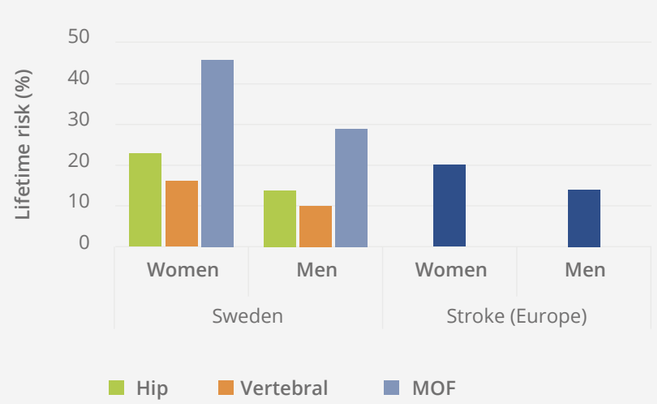


FRAGILITY FRACTURES IN THE CONTEXT OF PUBLIC HEALTH PRIORITIES

> The latest fracture, which is my third, occurred when I had flu and coughed.
>
> *Anita, Sweden*

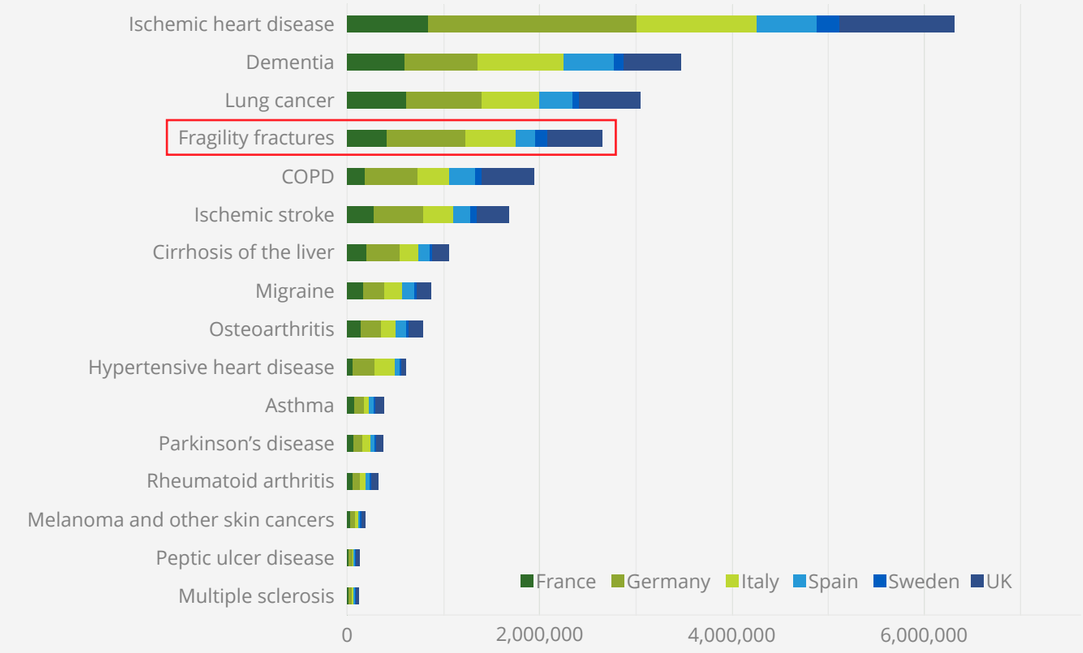
Fragility fractures represent a health risk for individuals aged 50 or above. In Sweden, the lifetime risk of suffering a hip fracture in this older population (both men and women) is comparable to the risk of stroke in Europe (20% for women; 14% for men).[35,36]

Lifetime risk of fragility fracture from the age of 50 years in Sweden and the equivalent risk of stroke in Europe



The fragility fracture burden in the EU6 is greater than that of many other chronic diseases (including COPD). It is surpassed only by ischemic heart disease, dementia, and lung cancer.[37]

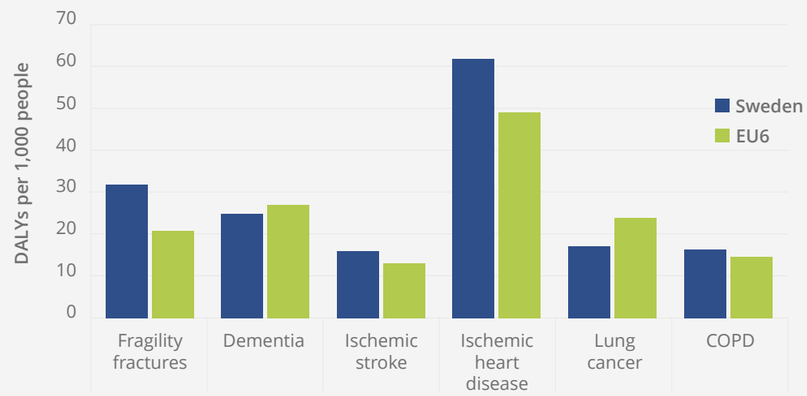
Country contribution to total disability-adjusted life years (DALYs) by disease in the EU6 in 17 selected diseases[7,12,14–21]



Fragility fractures are the fourth leading cause of chronic disease morbidity, rising from a ranking of sixth in 2009. Across the EU6, fragility fractures now account for 2.6 million DALYs (a measure of the impact of a disease or injury in terms of healthy years lost[25]) annually, more than for hypertensive heart disease or rheumatoid arthritis.[7]

The DALYs lost per 1,000 individuals due to fragility fractures in Sweden were estimated at 32 DALYs, substantially higher than the average for the EU6 nations (21 DALYs), and higher than the national burden associated with other major chronic diseases of aging (dementia, ischemic stroke, lung cancer, and COPD).[37]

DALYs per 1,000 people (aged over 50 years) by disease in Sweden and the EU6[37]

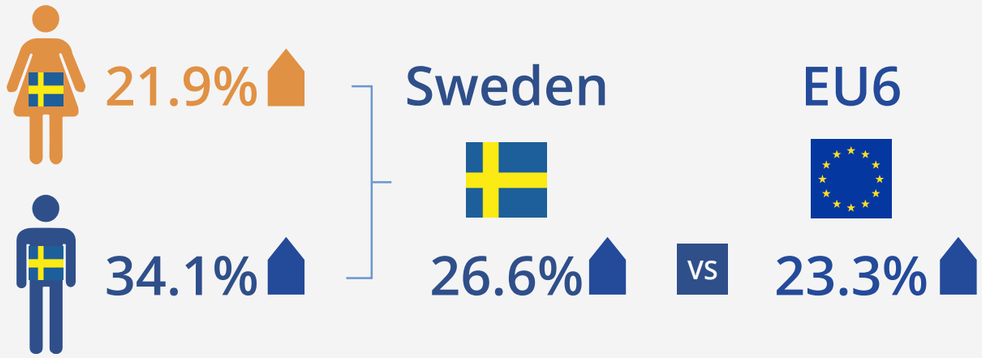


FRAGILITY FRACTURES ARE A GROWING CHALLENGE IN THE PUBLIC HEALTH LANDSCAPE

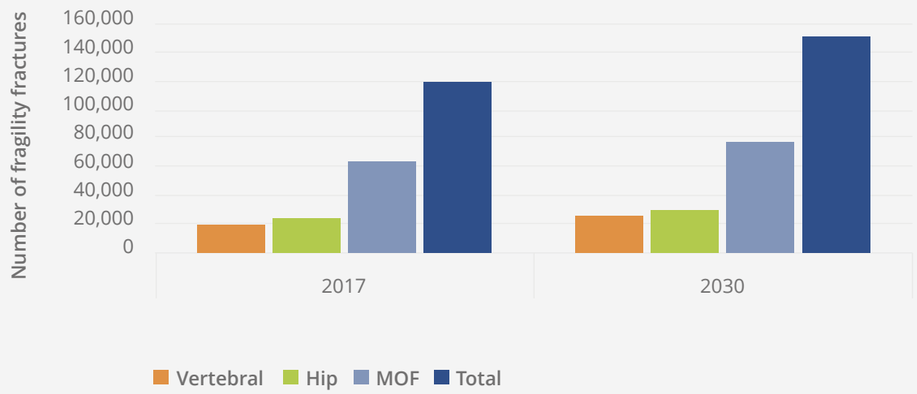
> Believe me when I say, living with these fractures is a nightmare that never goes away.
>
> *Christine, UK*

An ever-growing public health challenge is emerging: approximately 120,000 fragility fractures occurred in Sweden in 2017, and the annual incidence is estimated to increase to 150,000 by 2030.[6]

This projected increase in fracture incidence in Sweden (26.6%) is slightly higher than the projected increase across the EU6 over the same period (23.3%):[6]

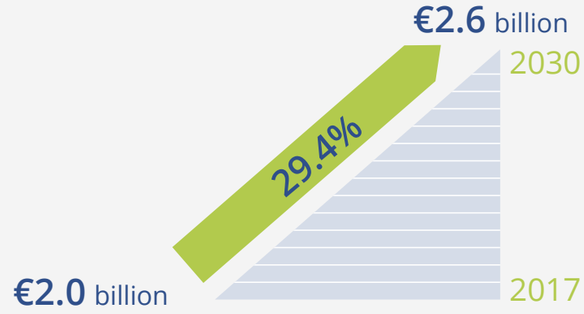


Estimated number of fragility fractures by fracture category for Sweden in 2017 and 2030

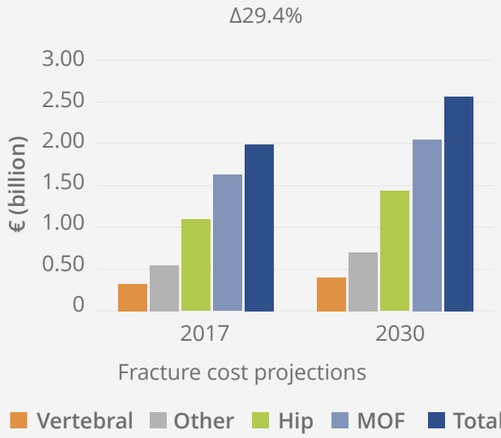


Fracture-related costs are set to rise

Fracture-related costs in Sweden are projected to increase by almost 30% between 2017 and 2030.[6] The projected increase in fracture costs for Sweden over this period is slightly higher than the overall average of 27.7% for the EU6 nations.[6]



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



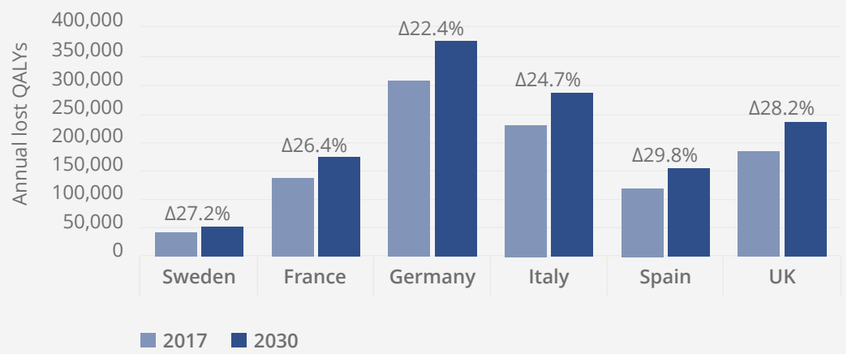
Δ percentage change for all fragility fractures

Although hip fractures make up **1/5** of total fractures, they are estimated to incur an estimated **55%** of total fracture-related costs in Sweden

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, with Sweden facing an increase of 27.2% over the period; slightly higher than the EU6 average of 25.6%.[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*

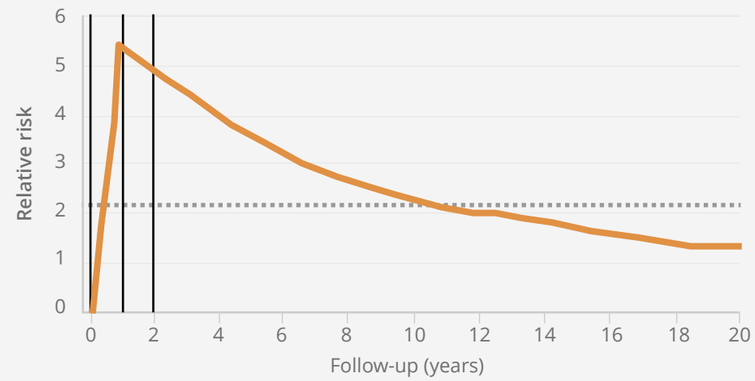
One fragility fracture leads to another

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.[38]

After an initial fragility fracture, a patient has an 86% increased risk of a subsequent fracture. The risk is highest within the 2 years immediately following the initial fracture, during which they are at **imminent risk** of a subsequent fracture at the same, or other, sites.[39] This is why it is critically important to identify patients as soon as possible after fracture to optimize fracture prevention treatments and keep the patient from having another fracture.

Similar patterns of imminent fracture risk have been observed in most countries evaluated,[23,24] but between-country comparisons are restricted by limited 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*.[38]

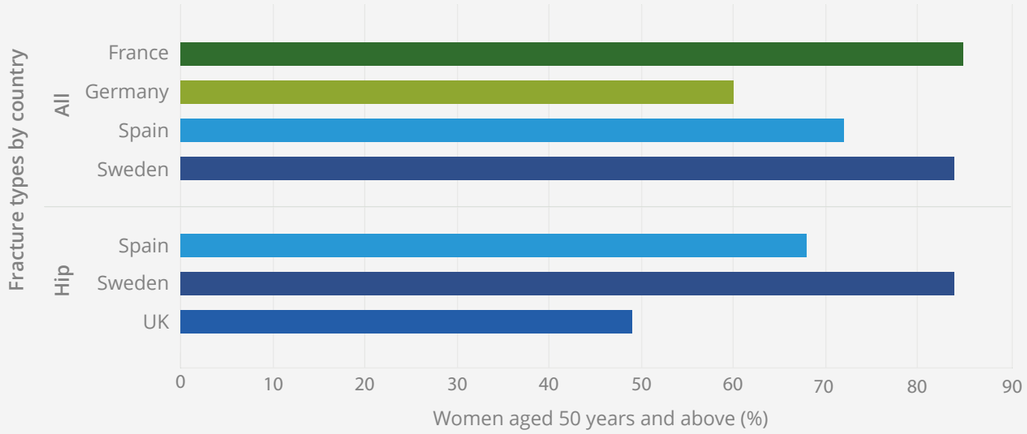
Most eligible patients do not receive treatment to prevent fragility fractures following their first fracture

With appropriate medical treatment, many fragility fractures can be avoided.

The Organisation for Economic Co-operation and Development (OECD) recognizes Sweden as a high-performing health system and efficient in terms of early surgical intervention and discharge from hospital to community services of hip fracture patients, yet highlights ongoing care as an area for improvement as it is: "less effective and only a small proportion of hip fracture patients receive preventive therapy".[40]

In 2015, the Swedish National Board of Health and Welfare guidelines set a target of 30% of patients to receive treatment following a fracture,[41] but the current rate remains well below this goal at only 17.2%:[6]

Proportion (%) of female patients (50 years and above) untreated within a year of osteoporotic fracture



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. orthopedic surgery, radiology, and primary care).

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.[5,45–50] 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]

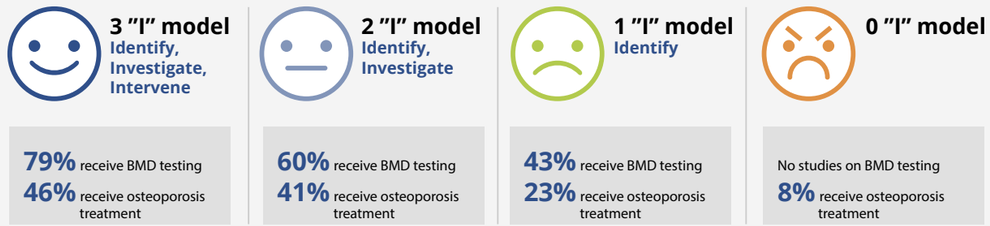
Outcome measure[51]	Effect of FLS (absolute change)	95% CI	Duration of follow-up (months)	Number of studies included
BMD testing	+24%	0.18 to 0.29	3–26	37
Treatment initiation	+20%	0.16 to 0.25	3–72	46
Treatment adherence	+22%	0.13 to 0.31	3–48	9
Re-fracture rate	–5%	–0.08 to –0.03	6–72	11
Mortality	–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 support the value of post-fracture care coordination to prevent fragility fractures and reduce the overall cost of care for these patients.[51,52]

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 (GP) referrals. In contrast, in the UK, the National Osteoporosis Society estimated that 55% of the UK population has access to an FLS.

FLSs are a cost-effective option for patient management

In Sweden, the cost per QALY of improving patient outcomes within an FLS has been estimated to be:[53]

€14,029
per QALY saved;
ICER post-hip fracture

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

Based on the results of a survey sent to a selected number of Swedish FLSs enrolled in IOF's CTF® network, 25–50% of hospitals and 1–10% of GPs report having a referral system for fracture patients. A recent health economic analysis suggested that the introduction of FLSs for all individuals aged over 50 years could prevent an estimated 1,371 subsequent fragility fractures in Sweden every year and a net saving of €2.3 million annually:[6]

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

The World Health Organization (WHO)[54] 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 ICER value of €14,029 per QALY saved and the Swedish GDP estimated to be €58,350,[55] FLSs not only offer **clear cost-effectiveness and cost savings for the healthcare system**, but also the possibility of improved care for the Swedish population.

A ROADMAP TO SOLVE THE FRAGILITY FRACTURE CRISIS IN SWEDEN

> Something else that affects my everyday life is fatigue. Pain results in incredible fatigue, which I think is difficult for others to be able to understand.
>
> *Anita, Sweden*

Key policy milestones in secondary fracture prevention:

2009: The Swedish Association of Local Authorities and Regions (SALAR) in collaboration with the National Board of Health and Welfare (NBHW) established a quality indicator related to treatment rate.

2012: The 'Nationella riktlinjer för rörelseorganens sjukdomar' issued recommendations with regard to diagnosis and pharmacological treatment.

2014: Update of the National Guidelines on Osteoporosis – systematic risk assessment, investigation and treatment of fragility fractures ('Osteoporos – Systematisk riskvärdering, utredning och behandling vid fragilitetsfraktur').

The epidemic of fragility fractures is higher in Sweden than in any other European country. Swedish authorities have realized the dramatic impact that fragility fractures have on patients' lives and healthcare systems, and have issued a number of recommendations to tackle this epidemic since 2009. While these measures have contributed to improved awareness of fragility fractures as a public health issue in Sweden, more can be done to improve implementation of the guidelines.

Three key areas have been identified where policies can give an impetus towards secondary fracture prevention.

1. Address the treatment gap

Sweden has been a precursor in adopting quality metrics in the field of fragility fractures:

- In 2009, SALAR, in collaboration with the NBHW, developed a quality indicator related to treatment rate (percentage of women aged 55 and older who received osteoporosis drugs within 6–12 months after fracture) in order to track and address variations across counties
- In 2015, the NBHW complemented this approach by establishing a national treatment target of 30% to be achieved by 2017[56]

Despite this target, the current treatment rate of patients who have had a fracture remains significantly below the 30% treatment target. The average treatment rate at the national level is estimated to be approximately 17.2% for women, 6–12 months after a fragility fracture. Not a single county reaches the 30% target.[41]

Moreover, a report by the Swedish Osteoporosis Association from July 2018 highlighted significant variations in treatment rate between counties: some counties show slightly better treatment rates (Värmland: 29%; Jämtland: 25%; Blekinge 23%), while others lag behind (Stockholm 9%; Västernorrland: 5%; Norrbotten 3%; Dalarna 3%).

What policy solutions can be implemented to meet this treatment target? How can we reduce variations across counties and make sure that all Swedish patients that experience fragility fractures have equal opportunities to be diagnosed and treated?[57]

We call further on counties to:

- Prioritize quality metrics related to fragility fractures and encourage healthcare professionals, including GPs, to meet the targets
- Track the administration of injectable drugs in primary care and hospital care that are not captured in the existing drug register
- Publish the results of the post-fracture intervention on a consistent basis to reinforce the impact of post-fracture care programs and solidify the sustainability of the programs

2. Promote the establishment of fracture chains in all counties

Unlike myocardial infarction, for which secondary prevention measures are systematically offered, only nine counties[59] have put in place structured, patient-centric approaches to treat patients aged above 50 who have experienced a fragility fracture, and thus prevent subsequent fractures.

Such structures are known as FLSs at international level, and fracture chains in Sweden. Whilst there is no one-size-fits-all, fracture chains usually rely on a coordinator, usually a nurse, who reviews the records of patients who experienced a fragility fracture, and determines which patients require a bone health assessment. The coordinator then ensures that a bone density measurement is carried out and that, if necessary, the patient receives treatment from their primary care physician. One success factor of the fracture chains is the multidisciplinary collaboration (e.g. orthopedic surgeons, GPs, physiotherapists, geriatricians).

FLSs in general and fracture chains in particular have proven to be effective, as previously discussed. The 2014 national treatment guidelines recommend a more systematic use of fracture chains in order to reduce the risk of further fractures.[59] Moreover, the 2018 report from the Swedish Osteoporosis Association demonstrates a positive correlation between fracture chains and treatment rates: the highest treatment rates can be found in counties where high-performing and coordinator-based fracture chains are in place.

As the NBHW will start reviewing the osteoporosis treatment guidelines, we believe that a stronger impetus should be given by the NBHW to counties with regard to fracture chains.

Moreover, we call on counties with few or no fracture chains, namely Norrbotten, Västerbotten, Västernorrland, and Stockholm, to:

- Implement the national guidelines' recommendations with regards the creation of fracture chains
- Unlock funding for 2–3 years to support the establishment of fracture chains, until the services are financially sustainable. Most of the investment corresponds to the funding of a nurse/coordinator, whose costs have been estimated around €80K per year per hospital. Such investment could be reduced in smaller hospitals where a part-time nurse could be sufficient. As the fracture chains become more effective, additional costs related to DXA scans and medication should be foreseen

We call on hospital managers and healthcare professionals interested in setting up a fracture chain to:

- Reach out to existing fracture chains to seek guidance on how to establish a fracture chain
- Leverage existing guidance documents, such as that developed by Västra Gotaland in 2015,[60] which suggests a two-step approach in the design of a fracture chain:
    - Define a clear care pathway covering investigation, treatment, and follow-up of patients with fragility fractures, as well as clear roles and responsibilities for all healthcare professionals involved in the fracture chain. A fracture chain 'leader' should be appointed
    - Outline an implementation plan, including cost planning, as well as targets and measures, to track the impact of the fracture chain in the local healthcare system

Fracture chain champions and coordinators are encouraged to act as thought leaders by:

- Creating a network of nurses who coordinate fracture chains, in order to facilitate dissemination of best practices and mutual support
- Leading mentorship programs, whereby a fracture chain champion organizes hands-on training sessions and site visits to disseminate best practices on the ground to healthcare professionals from counties where fracture chains are missing or struggling. Similar programmes established in Denmark and at international level through the IOF could be used as a source of inspiration
- Assisting in the development of a budget impact model that could help healthcare professionals and institutions to estimate costs of setting up an FLS, as well as clinical and economic benefits that could derive from a well-performing FLS

3. Increase involvement of primary care practitioners in fracture prevention

Primary care practitioners play a central role in secondary fracture prevention, since the majority of osteoporosis drugs are prescribed in a primary care setting. The Västra Gotaland guidelines alluded to a new funding mechanism whereby GPs would receive a lump sum if they meet a certain treatment target, e.g. 30%, in line with the NBHW's recommendations. Such a mechanism would facilitate the continuity of care between the fracture chain and the home environment, ensuring that patients receive a treatment that reduces the risk of subsequent fractures.

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IOF Steering Committee

Professor John Kanis, Emeritus Professor in Human Metabolism and the Director of the WHO Collaborating Centre for Metabolic Bone Diseases, University of Sheffield, UK

Professor Eugene McCloskey, Professor in Adult Bone Diseases, Department of Oncology and Metabolism, University of Sheffield, UK

Professor Nicholas Harvey, Professor of Rheumatology and Clinical Epidemiology, MRC Lifecourse Epidemiology Unit, University of Southampton, UK

Dr. Kassim Javaid, Associate Professor in Metabolic Bone Disease, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, UK

Fredrik Borgström (PhD), Associate Researcher, Medical Management Centre, Department of Learning, Informatics, Management and Ethics, Karolinska Institutet, Sweden and Partner at Quantify Research, Sweden

IOF Consultation Panel

France

Professor Bernard Cortet (GRIO), Professor in Rheumatology, University Hospital Lille, France

Professor Thierry Thomas (SFR), Professor of Medicine and Head of the Rheumatology Department, University Hospital St. Etienne, France

Professor Laurent Grange (AFLAR), Professor in Rheumatology, University Hospital Grenoble, France

Germany

Professor Claus Glüer (DGO), Professor of Medical Physics, Department of Radiology and Neuroradiology, University Medical Center Schleswig-Holstein, Kiel University, Germany

Professor Andreas Kurth (DVO), Chief Orthopedic Specialist, Department of Traumatology, Orthopedics and Hand Surgery, Community Hospital Mittelrhein gGmbH, Germany

Professor Peyman Hadji (DVO), Head of the Department of Bone Oncology, Endocrinology and Reproductive Medicine, Krankenhaus Nordwest, Germany

Thorsten Freikamp (BfO), Managing Director, Federal Self-help Association for Osteoporosis (BfO), Germany

Italy

Professor Maria Luisa Brandi (FIRMO), Professor of Endocrinology and Metabolic Diseases and Director of the Operative Unit of Diseases of Mineral and Bone Metabolism, Medical School, University of Florence, Italy

Professor Stefano Gonnelli (SIOMMMS), Associate Professor of Internal Medicine and Director of the School of Specialization in Emergency Medicine and Urgency, University of Siena, Italy

Professor Giuseppe Sessa (SIOT), Professor of Orthopedics and Traumatology and Director of the Orthopedic Clinic of the Vittorio Emanuele Polyclinic, University of Catania, Italy

Spain

Dr. Josep Blanch Rubio (SEIOMM), Clinical Director of the Institut Blanch de Reumatologia, Spain

Professor Adolfo Diez-Perez (SEIOMM), Head Emeritus of Internal Medicine at the Hospital del Mar, Autonomous University of Barcelona, Spain

Maria Antonia Robles Palacios, President of AECOSAR, Spain

Dr. Santiago Palacios (FHOEMO), Director of Instituto Palacios, Salud y Medicina de la Mujer, Spain

Sweden

Professor Mattias Lorentzon (SVOS), Professor in Geriatric Medicine, Institute of Medicine, University of Gothenburg, and Chief Physician, Osteoporosis Clinic at the Sahlgrenska University Hospital, Sweden

Lisa Keisu Lennerlöf (Osteoporosforbundet), Chair of Osteoporosforbundet, Swedish Osteoporosis Association, Sweden

UK

Professor Cyrus Cooper, Professor of Rheumatology and Director of the MRC Lifecourse Epidemiology Unit, University of Southampton, UK and Professor of Musculoskeletal Science at the NIHR Musculoskeletal Biomedical Research Unit, University of Oxford, UK

Fizz Thompson (NOS), Clinical and Operations Director at National Osteoporosis Society, UK

Dr. Celia L Gregson, Consultant Senior Lecturer and Arthritis Research UK Clinician Scientist, Musculoskeletal Research Unit, Bristol Medical School, University of Bristol, UK

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

9 rue Juste-Olivier • CH-1260 Nyon
T +41 22 994 01 00 • F +41 22 994 01 01

info@iofbonehealth.org • www.iofbonehealth.org

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twitter.com/iofbonehealth

pinterest.com/iofbonehealth

instagram.com/worldosteoporosisday

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