



# SOLUTIONS FOR FRACTURE PREVENTION

 IN THE NETHERLANDS



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Report compiled by the International Osteoporosis Foundation (IOF) under the umbrella of Capture the Fracture® initiative (CTF), in collaboration with Dutch bone health experts.



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# SUMMARY

This document provides an assessment of the current policy and post-fracture care landscape in the Netherlands, and provides recommendations which are aligned to the needs and opportunities identified by the IOF Capture the Fracture Partnership policy group in collaboration with a panel of Dutch experts.

## This document aims to:

### **SECTION 1 - A Problem on the Rise**

Summarize the increasing burden of fragility fractures in the Netherlands

### **SECTION 2 - Successes and Failures Observed**

Map out what has been successfully established in the Netherlands, and identify areas for improvement

### **SECTION 3 - Solutions Exist: Policy Recommendations**

Provide health policy recommendations to address the burden of osteoporosis and fragility fractures and drive their implementation

### **SECTION 4 - Build your Response**

Support local stakeholders in prioritising osteoporosis and fragility fractures

### **SECTION 5 - Expected Benefit of FLS**

Provide a detailed report on the benefits of Fracture Liaison Services (FLS) and improvements in patient outcomes

## Key Messages

*The increasing burden of osteoporosis, treatment gap and importance of secondary fracture prevention*

- a. Fragility fractures are a major concern for public health in the Netherlands** and are associated with a substantial (and escalating) health and financial burden. More than 120,000 fragility fractures occur annually in the Netherlands and the burden of osteoporosis-related costs were estimated at €1.4 billion in 2019. With an ageing population and no change in policy, the number of fragility fractures is expected to increase by more than a third over the next 15 years.
- b. Osteoporosis remains largely underdiagnosed and undertreated.** In the Netherlands, according to the SCOPE 2021 report, out of the 976,000 individuals diagnosed with the disease in 2019, 22.1 % were men. Today, 400,000 Dutch women at high risk remain untreated for osteoporosis, despite effective and safe medications; and although data is not available, experts expect that undertreatment is also a major issue in men. Poor treatment initiation is especially marked in high-risk patients with half of Dutch women (aged 50 years and above) not currently receiving effective secondary fracture prevention after an initial fragility fracture, despite this population being most likely to sustain a further fracture.
- c. Fracture Liaison Services (FLS) are needed.** Despite the recognized benefits of FLS, (a model of Post Fracture Care) in reducing the risk of fractures, FLS implementation could be optimized. This represents a substantial missed opportunity, as it is established that those who have sustained a fracture are vastly more likely to sustain another, and that targeting treatment in this group through FLS is a viable, and high-yield place to start.

## Key Recommendations

Although several initiatives are already in place and need to be reinforced, specific recommendations include:

- 1. Improved awareness** of osteoporosis and fragility fractures in both lay and healthcare spheres
- 2. Increased deployment of FLS for patients** with a recent fracture to facilitate increased post-fracture screening, diagnosis and treatment rates
- 3. Better coordination** between primary care physicians, secondary care health professionals and pharmacists in monitoring adherence to therapy

- 4. Identification and sharing of best practices** at a local level leading to the publication of an optimal patient pathway
- 5. Further research on the male population** affected by osteoporosis and fragility fractures

## Expected outcomes from the Netherlands Benefits Calculator

Increased uptake of FLS will lead to:

**About 3,140 subsequent fragility fractures prevented over the next 5 years leading to substantial improvements in patients' health and outcomes.** Concurrent reductions in hospitalisations and costs of treating osteoporosis will lead to far greater savings than interventions instigated for other chronic diseases.

**Highly beneficial, cost-effective solutions** to reduce the increasing burden imposed by osteoporosis on patients and society at large.

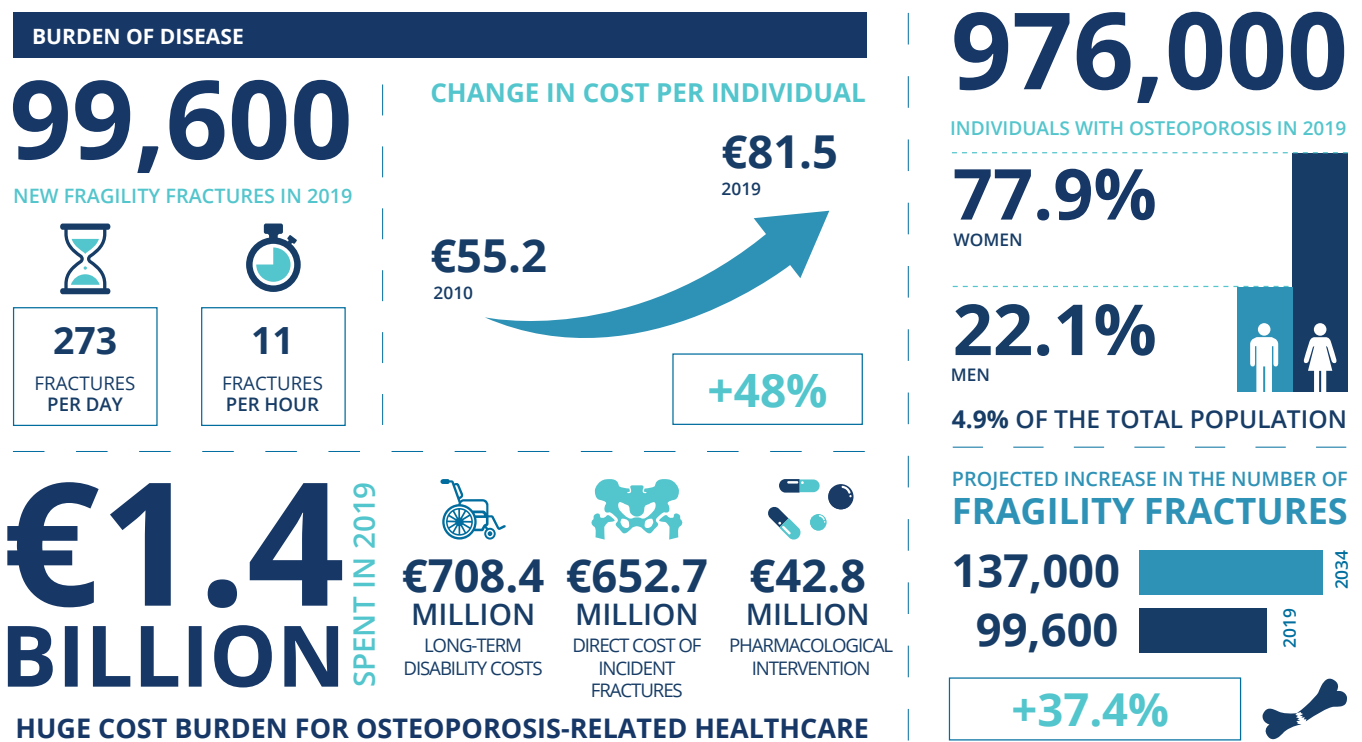


# A PROBLEM ON THE RISE

Osteoporosis is a disease that makes bones weak and fragile. This greatly increases the risk of breaking a bone even after a minor fall. The disease has no obvious symptoms, so many people do not know they have osteoporosis until they suffer a fracture.

These, osteoporotic ‘fragility fractures’ are common, particularly in older adults and are increasing in prevalence. Fragility fractures can be life-altering, causing pain, disability and loss of independence, and are associated with a substantial direct and indirect financial burden. Figure 1 summarizes key data regarding the burden of osteoporosis and fractures in the Netherlands from the large European SCOPE study.

Figure 1  
Burden of osteoporosis-related fractures in the Netherlands (ScoreCard for Osteoporosis in Europe, SCOPE 2021)



## Population ageing

**The proportion of elderly increases markedly.** In 2019, in the Netherlands, the average life expectancy was 83.6 years for women and 80.5 years for men. It is predicted that by 2040, 25% of the Dutch population will be over 65 years of age, compared to 20% in 2020. Those over 80 years of age account for 5% of the population in 2020 and this figure is predicted to rise to 8% by 2040.

**Increasing age leads to increased fractures.** This shift in demographics will dramatically increase the incidence and societal burden of fragility fractures occurring in the population.



## Fractures are common with dramatic consequences for patients

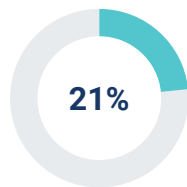
**Fragility fractures are a substantial public health issue.** The SCOPE study reported about 100,000 fractures occurred in the Netherlands in 2019 (approximately 11 fractures per hour) and there are currently estimated to be 1 million individuals living with osteoporosis (6% of the general population). Another Dutch study using the VEKTIS database (health insurance claims database including the healthcare expenditures of 99 % of the 16.5 million Dutch citizens) reported a total of 120,000 fractures in the Netherlands in the year 2010.

**Fragility fractures affect numerous women and men.** The prevalence of osteoporosis in the over 50s is 21% for women and 6% for men. Furthermore, the lifetime risk of hip fracture (the most serious fracture type) from age 50 in women is 13% and 5% in men.

WOMEN

**+50**

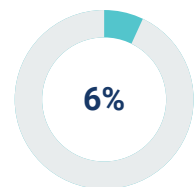
YEARS



MEN

**+50**

YEARS



**Fragility fractures are on the rise.** With life expectancy continuing to increase, fragility fracture incidence in Netherlands is predicted to increase by 37% in the next 15 years.

**Re-fractures are also on the rise.** It is well recognised that the risk of further fractures after an initial fracture is significantly higher. In the 2 years following a clinical fracture, further fractures occur in 10% of individuals. This proportion increases to 17% within 5 years of the sentinel fracture.

**Fragility fractures increase are associated with increased death.** A high percentage (approximately one third) of elderly patients with hip fractures will die within 5 years as a result of complications of illnesses and treatment. In another Dutch study involving patients aged over 65 years with hip fractures, approximately 20% died within 1 year.

APPROXIMATELY

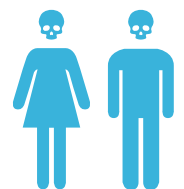
**1/3**  
OF ELDERLY  
PATIENTS



**WITH  
HIP  
FRACTURES**



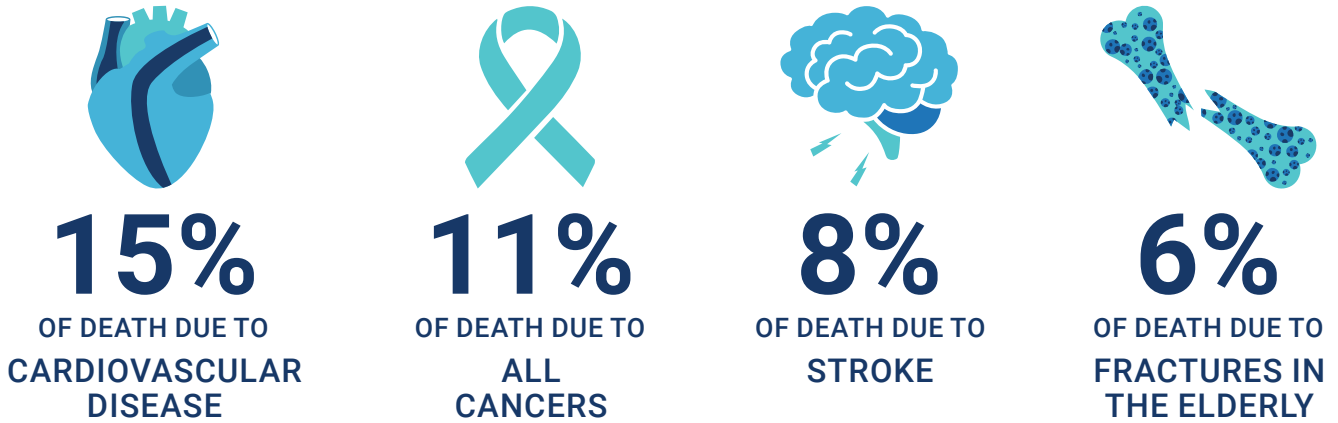
**WILL DIE  
WITHIN  
5 YEARS**



**Fragility fractures cause pain, disability, loss of independence, and significantly impact the quality of life.** In the Netherlands, in 2010, previous and incident fractures accounted for 26,300 quality-adjusted life years (QALYs) lost.

**Fragility fractures are one of the top 5 healthcare priorities.**

According to World Health Organization data, in the Netherlands, 15% deaths are attributed to cardiovascular diseases, 11% for all cancers, stroke 8% and 6% to fractures in the elderly. This highlights the need for investment to combat this important issue.



## Financial impact

**Fragility fractures are costly to the healthcare system.** In 2019, the total related burden for osteoporosis was estimated at €1.4 billion (almost €80 per inhabitant), including €650 million for direct costs of incidence fractures, €700 million for long-term disability costs and €43 million for pharmacological treatment. The total yearly direct costs of a hip fracture was estimated at €27,500 per patient even before considering long-term therapy and pharmacological intervention.



**Financial burden is on the rise.** Due to the aging population, the direct costs of new fragility fractures are predicted to increase by more than one-third in next 15 years. Another Dutch study reported that the costs for osteoporosis-related fractures were projected to increase by 50% from 2010 to 2030.

**Fragility fractures do not just affect national finances directly, but also indirectly** through fractures in the workforce and the additional care required from family and relatives of working age. A Dutch study reported that indirect costs account for roughly half of the total costs of clinical fractures, which are largely related to sick leave.



# SUCCESSSES AND MISSED OPPORTUNITIES OBSERVED

We have identified positives initiatives that need to be reinforced and missed opportunities which need to be grasped.

## Positive initiatives that needs to be reinforced/improved

**“Zinnige Zorg Verbetersignalement Osteoporose”.** The Dutch Healthcare Institute (Zorginstituut Nederland, ZIN) recently published in August 2020 a new report “Zinnige Zorg - Verbetersignalement Osteoporose” (‘Sensible Care – Room for Improvement Report Osteoporosis’). This landmark report has been supported and endorsed by various parties, including the International Osteoporosis Foundation and has been developed with input from notable Dutch key opinion leaders, including Prof. Willem Lems, Prof. Joop van der Bergh and Harry van den Broek (from the Dutch Osteoporosis Patient Association). The Zorginstituut Nederland will monitor and report on the implementation process in the form of progress reports. The following ten key action points to help healthcare professionals improve their osteoporosis care services are emphasized in the report:

*Table 1  
Ten action points to help healthcare professionals improve their osteoporosis care services, Dutch National Health Care Institute, 2020*

10 Key Action Points	
1.	Make the fracture prevention care process explicit and bring it to the attention of hospitals, care professionals and health insurers
2.	Adjust guidelines and link them to each other
3.	Increase accessibility to Bone Mineral Density tests for patients over the age of 50
4.	Improve diagnosis and reporting of vertebral fractures
5.	Provide falls assessment and interventions services
6.	Treat more osteoporosis patients with bone-sparing medication, and provide lifestyle and fall prevention advice
7.	Treat more glucocorticoid users with bone-sparing medication
8.	Encourage patients to maintain treatment with bone-sparing medication
9.	Do not stop using denosumab without post treatment
10.	Improve patient information and availability of decision aids

**Initiation of a nationwide clinical hip fracture audit** in 2016, called the Dutch Hip Fracture Audit (DHFA). The DHFA aims to improve the quality of care by providing insight into the actual quality of hip fracture care in daily practice, and then to define targeted initiatives to be launched to improve the overall quality of hip fracture care.



**The Netherlands has a good foundation for FLS.** As of March 2022, there are 14 centres following IOF/CTF guidelines, including 3 gold star, 6 silver star, 1 bronze star services. A previous survey conducted in 24 of the 90 non-university hospitals in the Netherlands, has further revealed that patients attending FLS were evaluated, treated and followed in high compliance with the IOF standards.

**14 CENTERS**  
AS OF MARCH 2022

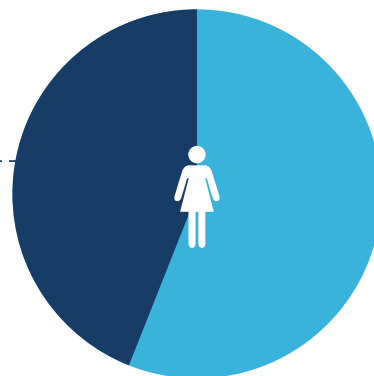


**The Dutch Osteoporosis Patient Association** is highly active to assist and advocate for patients with osteoporosis.

**Two guidelines for treatment of osteoporosis are currently in revision and expected for 2022:** the guideline for general practitioners (NHG) and the guideline for medical specialists.

## Gaps and missed opportunities

**308,000**  
WOMEN TREATED FOR OSTEOPOROSIS



**388,000**  
WOMEN REMAIN UNTREATED FOR OSTEOPOROSIS

**696,000**  
WOMEN ELIGIBLE FOR OSTEOPOROSIS TREATMENT

**56%**  
TREATMENT GAP

Figure 2  
Treatment gap in Dutch women  
(ScoreCard for Osteoporosis in Europe, 2021)

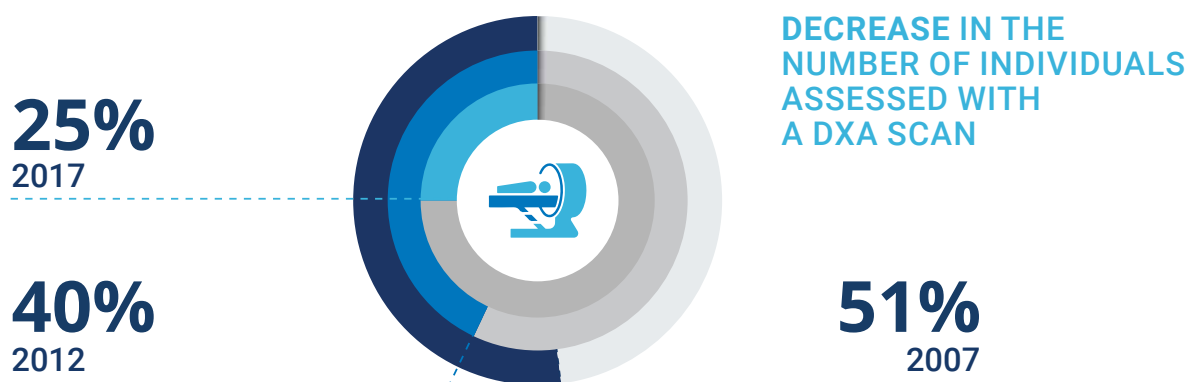
The “Zinnige Zorg - Verbetersignalement Osteoporose” report suggested that the current regime for fracture prevention is inadequate and can be improved, and also highlighted discrepancies between set guidelines and how they are interpreted and enforced by the healthcare professionals.

**About 400,000 Dutch women at high risk remain untreated for osteoporosis,** despite effective and safe medications. Experts assume that men at high risk are also vastly undertreated.

**Poor treatment initiation especially in those at high risk.** Those who have had one fracture are highly likely to sustain another. Despite this, the SCOPE study estimated that 56% of Dutch women (aged 50 years and above) do not currently receive preventative treatment after an initial fragility fracture. This treatment gap is slightly lower than the estimation of 60%-72% from a Dutch study in 2010 using the Achmea Health Database representing 4.2 million Dutch inhabitants.

### Low detection rate of osteoporosis

- Dual X-ray absorptiometry (DXA) referral for bone mineral density assessment is therefore low. Further, studies have shown that **the number of individuals being assessed with a DXA scan after fracture has decreased** in the last two decades. For those individuals over 50 year with a fracture in 2007 – 2008, 51% received a DXA scan or had a vertebral fracture assessment (VFA). This decreased to 40% by 2012 and to 25% in the years 2013 to 2017. The reason for this has been identified as a shift in the source of referrals. Over 14% of fracture patients are not being properly registered in the Emergency Department and therefore are not referred to a dedicated osteoporosis clinic.



- **The low detection rate of osteoporosis has been attributed to a lack of human resources, insufficient budget allowance and patient unawareness (next to unawareness in (orthopaedic) surgeons).** In 2 studies, it was shown that in 42% (36 out of 86) of hospitals there was only 1 dedicated osteoporosis nurse working 20 hours per week or less on osteoporosis care, including inviting patients for DXA.
- Lack of awareness among both patients and surgeons about **the need for further assessment after an initial fracture.** It has also been documented that 50% of patients (sustaining an initial fracture) were invited for a DXA scan but did not attend.

**Poor medication intake and adherence.** It has been reported that less than half of those diagnosed with low bone density after a fracture received drug therapy, even though, since 2006, Dutch citizens have compulsory, single healthcare insurance, which covers primary care, outpatient and hospital care, and medications. It was further demonstrated that more than 50% of patients starting anti-osteoporosis medication discontinued therapy within 12-months, of which only a small



proportion (20%) restarted or switched during an additional 18-month follow-up.

**A lack of detailed epidemiology.** In published articles over the last 20 years, numerous studies have noted deficiencies in the descriptive epidemiology of osteoporosis including gender- and age-specific incidence of bone disease and healthcare costs of osteoporotic fractures. This information is necessary to formulate projections and assist policy development. It also suggests a deeper inspection of the problem is needed with pump-priming research funding required.

**Patient information resources are not adequately maintained.**

The public patient information on websites is not always complete and correct, and there are several decision aids that are difficult to locate and navigate.

**Nurses, nurse practitioners and DXA technicians are not directly covered by the reimbursement system** (DBC) but their availability is facilitated and negotiated on a yearly basis in departmental budgets, which are set to be further impacted by cost reductions, as outlined in the `Hoofdlijnenakkoord` agreement (Outline agreement)

# SOLUTIONS EXIST: POLICY RECOMMENDATIONS

Specific recommendations for policy include:

- 1 Raise awareness in both lay public and healthcare spheres**
  - It is absolutely key to work with patient associations to raise awareness within the lay public. Patient information on the risk of further fractures could be improved and it is suggested that an osteoporosis support group formed by patients could help enforce the awareness of the 'at risk' community. This has been a success in countries such as Canada.
  - Another important challenge is to increase primary care physician awareness and involvement in post-fracture care management. This could be achieved via **financial incentives**, a model which already exists for other chronic diseases, for example diabetic care. Financial incentives within a hospital setting should also be considered, for example with the simplification and improvement of the Diagnosis Treatment Combination (DBC).
- 2 Increased deployment of FLS for patients with a recent fracture to facilitate increased post-fracture screening, diagnosis and treatment rates**
  - Emphasise the need for thorough assessment of patients who experience fractures. Included within this is a requirement for increased awareness of the importance of bone mineral density assessment via DXA scanning after fracture. This increase should be taken in account when discussing budgets.
  - Specialist nurses and nurse practitioners are central to the development and activities of FLS.
  - Utilise the multi-disciplinary team to improve adherence to anti-osteoporosis medication. Collaboration between primary care physicians, nurses, secondary care health professionals and pharmacists in monitoring adherence to therapy is essential.





**3** Continue to identify and share best practices at a local level leading to the publication of an optimal patient pathway. This can be achieved via:

- Better alignment of guidelines for each institution.
- Reinforcing the requests for a pathway for osteoporosis assessment direct from the Emergency Department.
- Building a network of osteoporosis allies via a 'one consultation pathway' ideally via a specialist nurse who would be part of the FLS gathering information on medication, falls and lifestyle.
- Current budgets are capped to cover 30% of fracture patients. Further initiatives such as the "Verbetersignalement" should be reinforced to facilitate post-fracture care.

# BUILD YOUR RESPONSE

## Find and treat your fractures (through the increase and optimisation of FLS)

- **Fracture pathway** - Ensure there is a clear and open pathway for referral of fracture patients from the Emergency Department
- **Facilitate DXA assessment** - Use financial incentives to encourage the use of DXA assessment in those who have sustained a fracture

## Make use of available resources

The International Osteoporosis Foundation has developed several tools to facilitate and improve the development of Post Fracture Care/FLS including:

1. **The Policy Toolkit** which is a CTF-P Guidance for Policy Shaping generic narrative and associated resources (slide kit in several languages, Executive Summary, Infographic, webinar and policy toolkit. <https://www.capturethefracture.org/resource-center/advocating-for-pfc/policy-toolkits>)
2. **The Capture the Fracture® Resource Centre** (<https://www.capturethefracture.org/resource-center>) which provides tools to achieve the following:
  - Implementing an FLS
  - Improving an FLS
  - Advocating for the development of FLS



The Capture the Fracture® programme provides tools and resources to optimise post-fracture care:

1. **The Best Practice Framework**

- Provides guidance for institutions that are implementing FLS
- Sets benchmarking criteria to stimulate quality improvement of post-fracture care services at the organisational level

2. **The Mentorship Program** which partners experienced partners of FLS with newly formed services

3. **Lyosis®**: a software package for optimizing the national clinical management of FLS and post-fracture care services ([www.lyosis.com](http://www.lyosis.com))

4. **The Benefit Calculator**: a microsimulation tool to estimate the financial consequences of improving post-fracture care.

## Reinforce your evidence base

- **Develop robust scientific research on fragility fractures** to provide epidemiological evidence and to standardize a series of quality and healthcare indicators.
- **Systematic registration of (subsequent) fractures**, hospital admissions, mortality and if possible quality of life, in patients with a fracture is needed and required to better substantiate the expected benefits. Data in men are also needed and important and will form an important part of post-fracture care policy.
- **Utilise the Benefit Calculator** to assess the expected financial impact of interventions to ensure you stay on track and utilise extensive resources available.

## Form a team

- **Many disciplines can assist.** Encourage osteoporosis training in a broad range of healthcare professionals: rheumatologists, endocrinologists, general physicians, gynaecologists, primary care physicians, pharmacists, physiotherapists, nurses (general, specialized, assistant) and dentists.
- **Key role for specialized nurses and nurse practitioners.** Most FLS have been initiated by nurses and there are about 80 FLS nurses and about 80 nurses practitioners (partly) involved in FLS care. The 3-day course for FLS nurses organized by V&VN-VF&O, the Dutch nurses' organization on FLS care, is an excellent initiative to be further expanded and reinforced.

- **Ensure buy-in from primary care.** This could include osteoporosis-centred consultations with decision-assisting digital tools or financial incentives with incorporation of osteoporosis assessments into primary care electronic health records and business software.
- **Mobilise a multi-disciplinary approach to anti-osteoporosis drug adherence.** Use specialist (FLS) nurses, pharmacists and primary care physicians to encourage medication adherence.

## Foster healthy ageing

- **Encourage bone health throughout the lifecourse, starting early.** Carry out prevention campaigns in schools which aim to answer questions including: How to build strong bones (bone capital)? Why is it important to take two dairy products per day? Why should we perform physical activity? How do we consume sufficient levels of protein?
- **Consider the following systematic interventions for those over the age of 50:**
  - a. screen height loss once a year
  - b. falls risk screenings
  - c. perform osteoporosis screening for patients suffering from chronic diseases (this could potentially be achieved by educating specialized nurses from other disciplines (primary care, respiratory, diabetes, neurology etc.))



**SCREEN HEIGHT LOSS**



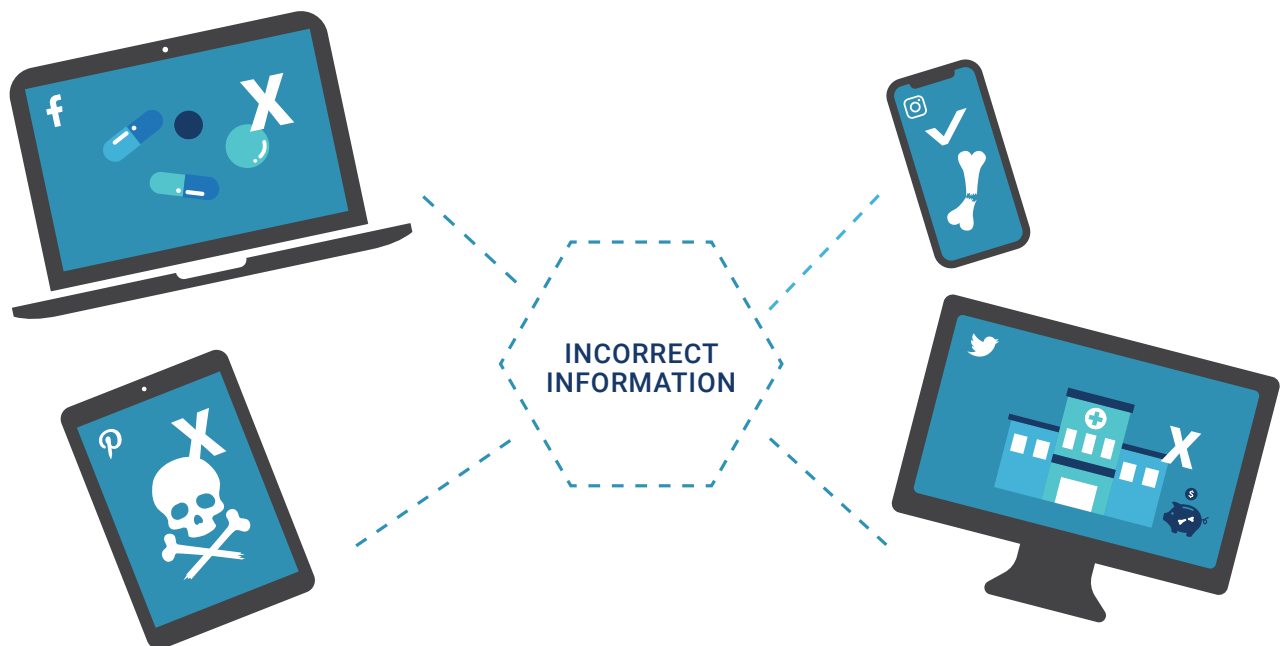
**OSTEOPOROSIS SCREENING FOR CHRONIC DISEASES**



**FALLS RISK SCREENINGS**

- **Promote falls prevention services and improve the physical capacity of older individuals,** in order to support physical activity and autonomy. Such programs should be coordinated by physiotherapists.
- Increase awareness among the general public.
- **Engage the public via digital media** and ensure that patient information websites are well-curated and maintained up to date.
- **Focus on fractures and capture 'osteoporosis'.** There are common misconceptions regarding osteoporosis including

“osteoporosis treatments are not effective” or “losing height is normal”. Targeting public health awareness campaigns at fractures will be more successful, for example “make the first fracture the last!” Osteoporosis is a silent condition and primary prevention is also key.



- **Increase awareness of osteoporosis throughout the lifecycle:**
  1. Leverage World Osteoporosis Day (on October 20 of each year) as a substantial opportunity to educate consumers and health professionals about osteoporosis and fracture prevention, and promote case-finding during this period.
  2. Consider engaging initiatives such as free bone mineral density assessments for women over 65 years.
  3. Start early with prevention campaigns in schools: how to build strong bones, encouraging physical activity, to get sufficient levels of protein.
  4. Focus on general health in the population: make sports fun, accessible and affordable by making it a priority in the policy of local councils.
  5. Incorporate osteoporosis screening into established annual elderly health checks.

# EXPECTED BENEFITS OF FLS

This section reports on the expected benefits of improved post fracture care through FLS compared to current practice in the Netherlands.

Additional recommendations and suggestions provided above could only reinforce osteoporosis care leading to additional extra benefits.

The expected benefits summarised here were estimated by employing a microsimulation model (reviewed and validated by Dutch experts) that takes simulated individuals through a care pathway as they would experience it today in the Netherlands, and compare its expected results to those if FLS were broadly operational throughout the country. Results are reported in terms of incidence of subsequent fractures, quality-adjusted life years (QALYs), use of health and social care resources, and FLS costs over the first five years. FLS are modelled according to their expected performance in terms of patient identification, assessment, treatment, and monitoring as reported by current FLS already operating in the Netherlands and the judgement of expert local key opinion leaders.

Figure 3  
Expected benefits of a realistic implementation of FLS in the Netherlands

The simulation was conducted for the expected number of people expected to experience a fragility fracture in the Netherlands during a given year. Through a realistic implementation of FLS in the Netherlands, we expect to see:

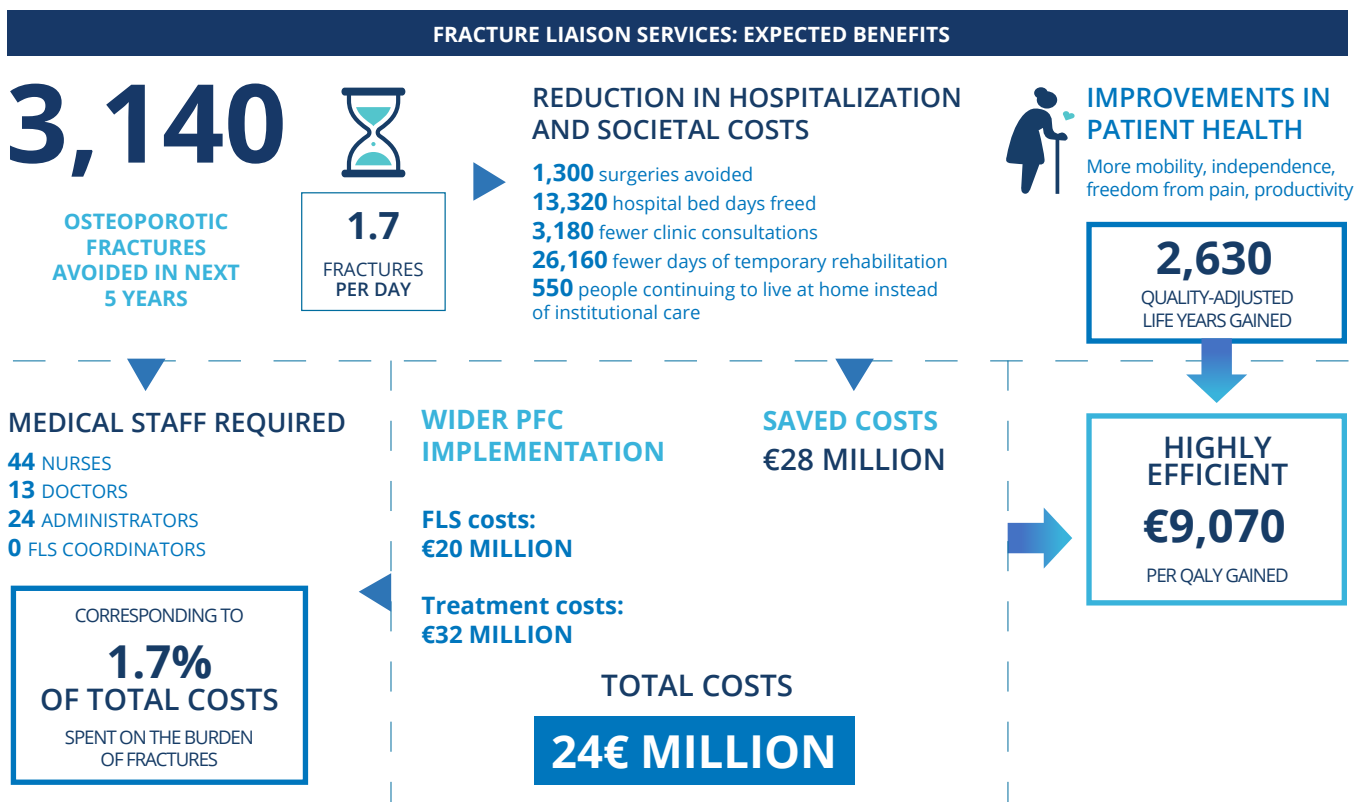


Figure 4 (right)

Yearly extra costs and QALYs gained by FLS within 5 years in the Netherlands

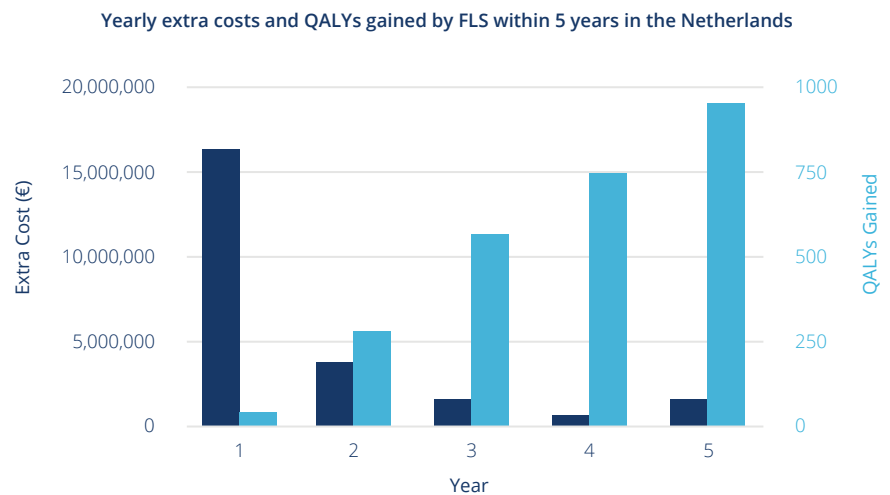


Figure 5 (below)

Cost per QALY gained by FLS over 5 years

Over Year	Cost per QALY gained
1	€280,000
2	€50,000
3	€22,000
4	€13,000
5	€9,000

- **Improvements in quality of care.** There are now clear data to support the notion that the introduction of post-fracture care initiatives, such as FLS, lead to improvements in the quality of care offered to fragility fracture patients.
- **Reductions in fragility fractures.** According to the Benefit Calculator, the number of osteoporotic subsequent fractures would be reduced by more than 3,140 (5.3% of the 59,828 expected with current practice) during the first five years of FLS implementation, with this figure due to substantially increase with continued FLS operation.

#### Leading to:

- **Reductions in hospitalization and societal costs.** Benefits of FLS implementation on one year of fracture patients followed for 5 years would include:
  - 1,300 surgeries avoided
  - 13,320 hospital bed days freed, and 119,900 hours of patient care released
  - 3,180 fewer clinic consultations
  - 26,160 fewer days of temporary rehabilitation
  - long-term institutional care cut by 1,050 person years
  - 550 people continuing to live at home who would have otherwise gone into institutional care
- **Improvements in patient health.** Every avoided fracture keeps people from losing mobility, and supports independence, freedom from pain, productivity, and so much more! Over its first five years, the PFC programme would lead to 2,630 years gained in perfect health (QALYs).
- **In a highly cost-effective way.** Although the extension of FLS would result in a net increase of 1.7% of current total costs, FLS offer clear cost-effectiveness (cost per QALY gained estimated at €9,070, much lower than cost-effectiveness thresholds used in the Netherlands), as well as the possibility of improved care for the Dutch population.
- **With immediate short-term economic benefits.** From year 2, the extension of FLS leads to cost-effectiveness (see figure 4)

# Glossary

**FRACTURE** – a broken bone

**FRAGILITY FRACTURE** - A broken bone which occurs due to minor force, such as a fall from standing height. The risk of fragility fractures can be reduced by lifestyle modifications, supplementation of calcium and vitamin D, falls prevention programmes and anti-osteoporosis medication.

**FRACTURE LIAISON SERVICE (FLS)** - See Post-Fracture Care Coordination Programme. A model of care which seeks to rehabilitate individuals after they have had a fracture and reduce the risk of them fracturing again in the future. The term is interchangeable with **POST-FRACTURE CARE (PFC) COORDINATION PROGRAMME**.

**OSTEOPOROSIS** - Osteoporosis is a disease in which the mass, density and strength of bone are reduced. As bones become more porous and fragile, the risk of fracture is greatly increased. The loss of bone occurs silently and progressively. It primarily affects the elderly and is more common in women than in men.

**PRIMARY PREVENTION OF FRACTURES** - Initiatives to prevent a first/sentinel/initial fracture occurring.

**SECONDARY PREVENTION OF FRACTURES** - Initiatives to prevent second/subsequent/further fractures occurring after the first fracture has occurred.

**QALY (QUALITY ADJUSTED LIFE YEARS)** - a generic outcome measure commonly used in economic evaluations that account both quantity and the quality of life. One QALY corresponds to one year of perfect health.



## References

- Borgström, F., L. Karlsson, G. Ortsäter, N. Norton, P. Halbout, C. Cooper, M. Lorentzon, et al. "Fragility Fractures in Europe: Burden, Management and Opportunities." [In eng]. *Arch Osteoporos* 15, no. 1 (Apr 19 2020): 59. <https://doi.org/10.1007/s11657-020-0706-y>.
- Dunnewind, T., E. P. Dvortsin, H. M. Smeets, R. M. Konijn, J. H. J. Bos, P. T. de Boer, J. P. van den Bergh, and M. J. Postma. "Economic Consequences and Potentially Preventable Costs Related to Osteoporosis in the Netherlands." [In eng]. *Value Health* 20, no. 6 (Jun 2017): 762-68. <https://doi.org/10.1016/j.jval.2017.02.006>.
- Eekman, D. A., M. M. ter Wee, V. M. Coupé, S. Erisek-Demirtas, M. H. Kramer, and W. F. Lems. "Indirect Costs Account for Half of the Total Costs of an Osteoporotic Fracture: A Prospective Evaluation." [In eng]. *Osteoporos Int* 25, no. 1 (Jan 2014): 195-204. <https://doi.org/10.1007/s00198-013-2505-4>.
- Huntjens, K. M., S. Kosar, T. A. van Geel, P. P. Geusens, P. Willems, A. Kessels, B. Winkens, P. Brink, and S. van Helden. "Risk of Subsequent Fracture and Mortality within 5 years after a Non-Vertebral Fracture." [In eng]. *Osteoporos Int* 21, no. 12 (Dec 2010): 2075-82. <https://doi.org/10.1007/s00198-010-1178-5>.
- Kanis, J. A., C. Cooper, R. Rizzoli, and J. Y. Reginster. "European Guidance for the Diagnosis and Management of Osteoporosis in Postmenopausal Women." [In eng]. *Osteoporos Int* 30, no. 1 (Jan 2019): 3-44. <https://doi.org/10.1007/s00198-018-4704-5>.
- Kanis, John A., Nicholas Norton, Nicholas C. Harvey, Trolle Jacobson, Helena Johansson, Mattias Lorentzon, Eugene V. McCloskey, Carl Willers, and Fredrik Borgström. "Scope 2021: A New Scorecard for Osteoporosis in Europe." [In eng]. *Archives of osteoporosis* 16, no. 1 (2021): 82-82. <https://doi.org/10.1007/s11657-020-00871-9>. <https://pubmed.ncbi.nlm.nih.gov/34080059>.
- Kanters, T. A., C. L. P. van de Ree, M. A. C. de Jongh, T. Gosens, and L. Hakkaart-van Roijen. "Burden of Illness of Hip Fractures in Elderly Dutch Patients." [In eng]. *Arch Osteoporos* 15, no. 1 (Jan 3 2020): 11. <https://doi.org/10.1007/s11657-019-0678-y>.
- Lötters, F. J., J. P. van den Bergh, F. de Vries, and M. P. Rutten-van Mölken. "Current and Future Incidence and Costs of Osteoporosis-Related Fractures in the Netherlands: Combining Claims Data with Bmd Measurements." [In eng]. *Calcif Tissue Int* 98, no. 3 (Mar 2016): 235-43. <https://doi.org/10.1007/s00223-015-0089-z>.
- Netelenbos, J. C., P. P. Geusens, G. Ypma, and S. J. Buijs. "Adherence and Profile of Non-Persistence in Patients Treated for Osteoporosis--a Large-Scale, Long-Term Retrospective Study in the Netherlands." [In eng]. *Osteoporos Int* 22, no. 5 (May 2011): 1537-46. <https://doi.org/10.1007/s00198-010-1372-5>.
- "Prognose: Bevolking Blijft Komende 50 Jaar Groeien." <https://www.cbs.nl/nl-nl/nieuws/2020/51/prognose-bevolking-blijft-komende-50-jaar-groeien>
- S, Wijma. *Improvement Alert: Sensible Care for People with Osteoporosis*, 2020.
- Svedbom, A., E. Hernlund, M. Ivergård, J. Compston, C. Cooper, J. Stenmark, E. V. McCloskey, B. Jönsson, and J. A. Kanis. "Osteoporosis in the European Union: A Compendium of Country-Specific Reports." [In eng]. *Arch Osteoporos* 8, no. 1-2 (2013): 137. <https://doi.org/10.1007/s11657-013-0137-0>.
- van den Berg, P., D. H. Schweitzer, P. M. M. van Haard, J. P. van den Bergh, and P. P. Geusens. "Meeting International Standards of Secondary Fracture Prevention: A Survey on Fracture Liaison Services in the Netherlands." *Osteoporosis International* 26, no. 9 (2015/09/01 2015): 2257-63. <https://doi.org/10.1007/s00198-015-3117-y>. <https://doi.org/10.1007/s00198-015-3117-y>.
- Voeten, Stijn C., Arend J. Arends, Michel W. J. M. Wouters, Bastiaan J. Blom, Martin J. Heetveld, Monique S. Slee-Valentijn, Pieta Krijnen, et al. "The Dutch Hip Fracture Audit: Evaluation of the Quality of Multidisciplinary Hip Fracture Care in the Netherlands." *Archives of Osteoporosis* 14, no. 1 (2019/03/01 2019): 28. <https://doi.org/10.1007/s11657-019-0576-3>.



*Our vision is a world without fragility fractures,  
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