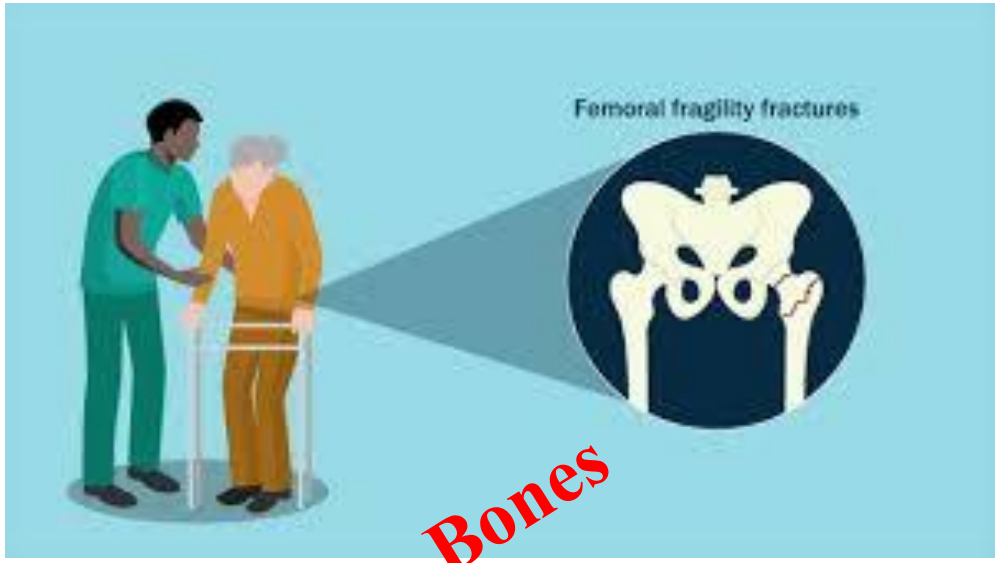
Epidemiology of Fragility Fractures



Broken Bones

Broken Lives

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Fragility Fractures

- A fracture arises when **the load-bearing capacity of a bone is exceeded by forces applied to it**, for example during trauma.

- Fragility fractures, which **result from low energy trauma**, such as a fall from standing height or less, are **the clinical outcome of osteoporosis**.

- A fragility fracture is **a break in the bone** from an impact that **would not normally be expected to cause a fracture**.

Fragility fracture is influenced by:

- Bone mineral density
- Bone geometry
- Microstructure and bone quality

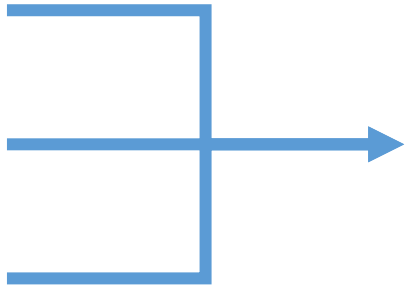
Fracture sites

- The most frequent fractures occur at the:
  - spine
  - hip
  - distal forearm (wrist)
  - proximal humerus (upper arm).

- This, however, does not exclude other sites, including fracture of the humerus, ribs, tibia (excluding the ankle), pelvis and other femoral fractures, where osteoporosis fractures can occur partly due to low BMD, especially after the age of 50 years.

Major consequences of fracture

- Substantial pain and disability
- Loss of independence
- Increased risk of morbidity



reduce the quality of life

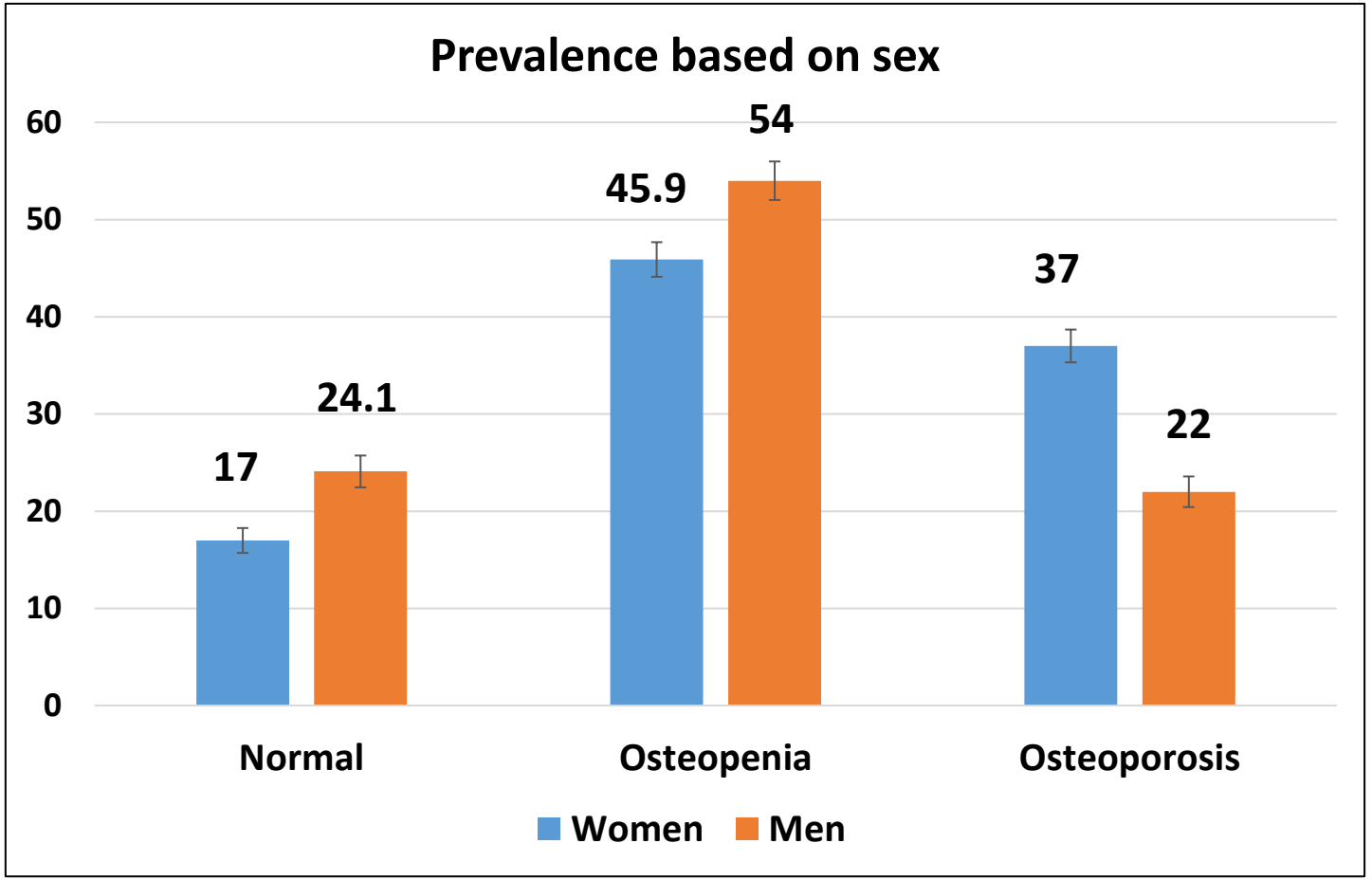
and

- Mortality (hip and vertebrae)

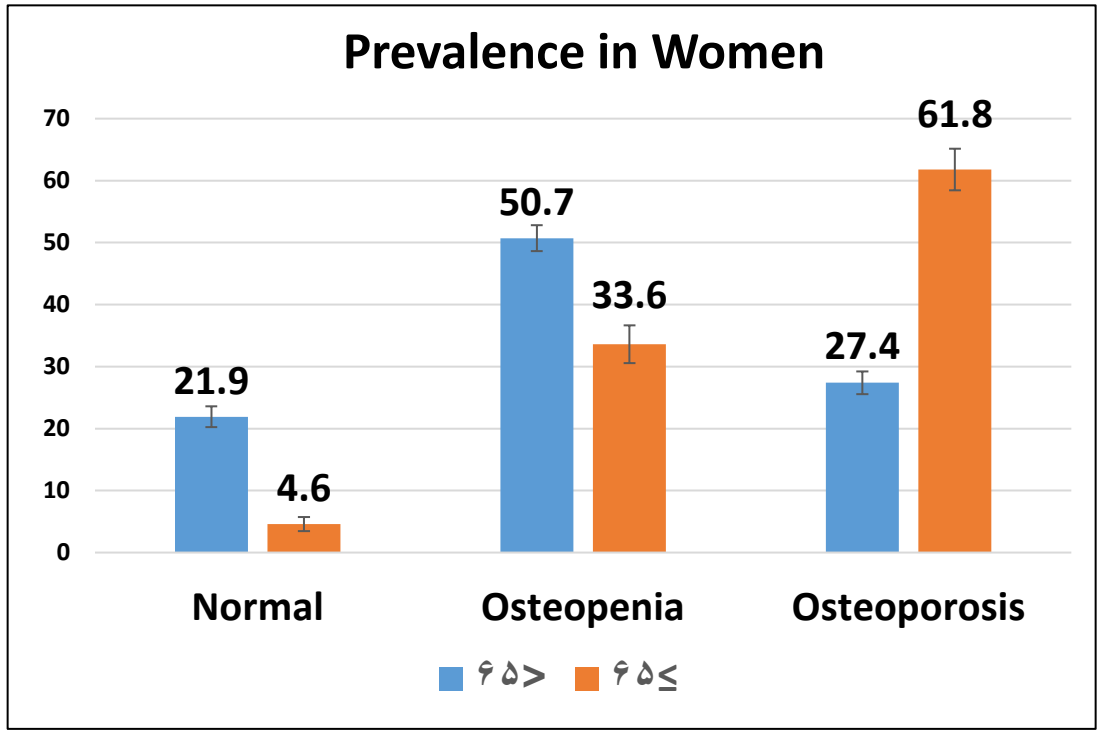
The impact of fragility fractures:

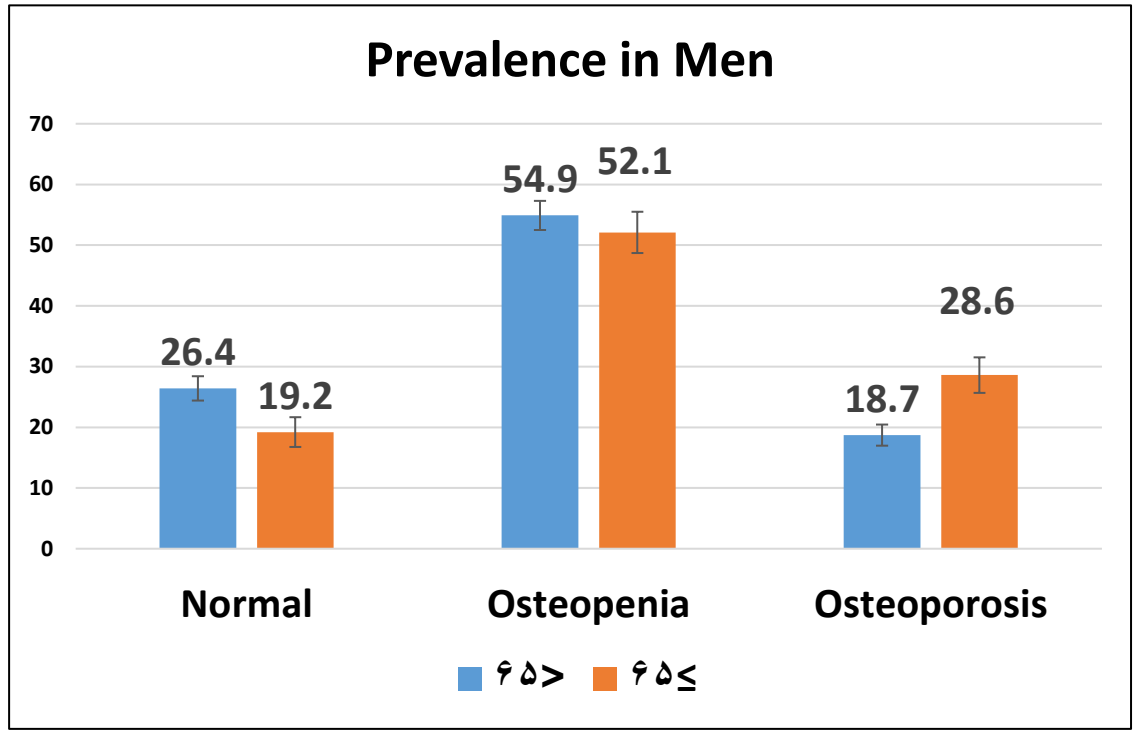
In 2019	1990
• 178 million new fractures globally	• An increase of 33.4%
• 25.8 million years lived with disability (YLDs) due to fractures	• An increase of 65.3%
• 455 million prevalent cases of acute or long-term symptoms of a fracture	• An increase of 70.1%

Prevalence of Osteoporosis by sex

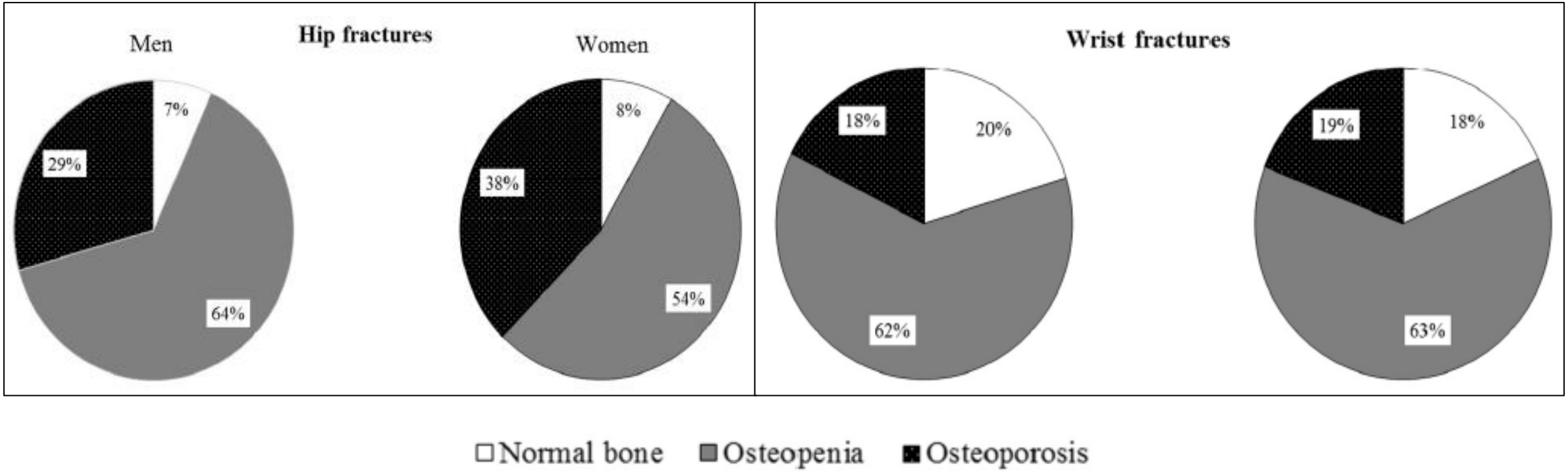


Prevalence of Osteoporosis by sex and age





Percentages of hip and wrist fractures in men and women with osteoporosis, osteopenia or normal BMD



Trajanoska K, Schoufour JD, de Jonge EA, Kieboom BC, Mulder M, Stricker BH, Voortman T, Uitterlinden AG, Oei EH, Ikram MA, Zillikens MC. Fracture incidence and secular trends between 1989 and 2013 in a population based cohort: The Rotterdam Study. Bone. 2018 Sep 1;114:116-24.

Incidence of Hip Fracture:

- The pooled standardized annual cumulative incidence of hip fractures was estimated as 138.26 (95% CI: 98.71–193.65) per 100,000 population and 157.52 (95% CI: 124.29–199.64) per 100,000 population in men and women, respectively.

WHAT ARE RISK FACTORS?

FIXED RISK FACTORS

- Fixed risk factors also include disorders and medications that weaken bone and affect balance, therefore increasing the risk of fracture due to falling – read more about secondary osteoporosis.
  - Age
  - Female gender
  - Family history of osteoporosis
  - Previous fracture
  - Ethnicity
  - Estrogen deficiency and amenorrhea
  - Menopause and ovariectomy

MODIFIABLE RISK FACTORS

- Most modifiable risk factors directly impact bone biology and result in a decrease in bone mineral density (BMD), but some of them also increase the risk of fracture independently of their effect on bone itself.

  These include:
  - Alcohol
  - Smoking
  - Low body mass index
  - Poor nutrition – low dietary calcium intake
  - Vitamin D deficiency
  - Eating disorders
  - Insufficient exercise
  - Frequent falls

PATIENTS AT HIGH RISK OF FRACTURE

- The risk of a subsequent fracture is highest in the first 2 years after an initial fracture. This future fracture risk then decreases with time.

- The 2nd major osteoporotic fracture (MOF) risk
  - ✓ 1st year: 2.7 time higher
  - ✓ At 10 years: 1.4 times

- **Age:** The majority of hip fractures (90%) occur in people aged 50 years or older. This is partly due to reduced bone mineral density as we age. But age can also be a risk factor independent of bone mineral density.
- **Sex:** Lifetime risk of any fracture ranges between 40-50% in women, compared to 13-22% in men.
- **Family history**: Osteoporosis has been shown in studies to have a large genetic component: a parental history of osteoporosis or of fracture (particularly a family history of hip fracture) is associated with an increased risk of fracture that is independent of bone mineral density.
- **BMI:** Leanness (body mass index (BMI) <20 kg/m^2) regardless of age, sex and weight loss, is associated with greater bone loss and increased risk of fracture. It is increasingly recognized that obesity is a risk factor for some fractures and for fractures in general after accounting for BMD
- **Alcohol**: High intakes of alcohol cause secondary osteoporosis due to direct adverse effects on bone-forming cells, on the hormone that regulates calcium metabolism and poor nutritional status (calcium, protein and vitamin D deficiency).
- **Smoking**: People with a history of cigarette smoking and people who smoke are at increased risk of any fracture, compared to non-smokers. Current smoking was associated with an increased risk of 25% for any fracture compared to non-smokers and 60% for hip fracture, after adjustment for BMD.
- **Physical activity**: Women who sit for more than nine hours a day are 50% more likely to have a hip fracture than those who sit for less than six hours a day.

Prevention of Fragility fractures

- Primary prevention
- Secondary prevention
- Tertiary prevention

Strategies for primary prevention

- Preventing or avoiding the initial occurrence of diseases or health conditions.
- These include actions to **identify risk factors** in individuals or populations, and **actions to mitigate or eliminate these risk factors**.

- Primary prevention strategies for fragility fractures mainly aim at promoting or maintaining bone density and strength. These include:
    - Improvement of diet and nutrition
    - Regular exercise and physical activity
    - Cessation of smoking and alcohol consumption
    - Treatment of osteoporosis
    - Prevention of falls.

Strategies for secondary prevention

- **Early detection of fragility fractures** and treatment is fundamental.

- **Most vertebral fractures are undiagnosed**, although they are common in postmenopausal women and older men.
- This is because they might be painless, or if there is pain, a person may not know it is caused by a fracture due to the many different causes of back pain.
- More obvious signs of spinal fractures are, loss of height and/or development of a curved upper back (sometimes called a Dowager's Hump).

- **Management of clinical fragility fractures is also key**. Treatment of fragility fractures can be surgical or non-surgical, with orthopedic surgeons playing a central role.

Strategies for tertiary prevention

- **Prevention of re-fracture** (usually called secondary fracture prevention) is essential.

- **Timely rehabilitation following treatment** is crucial to support people to recover from the fracture and related functioning loss.

Fracture Liaison Services (FLS)

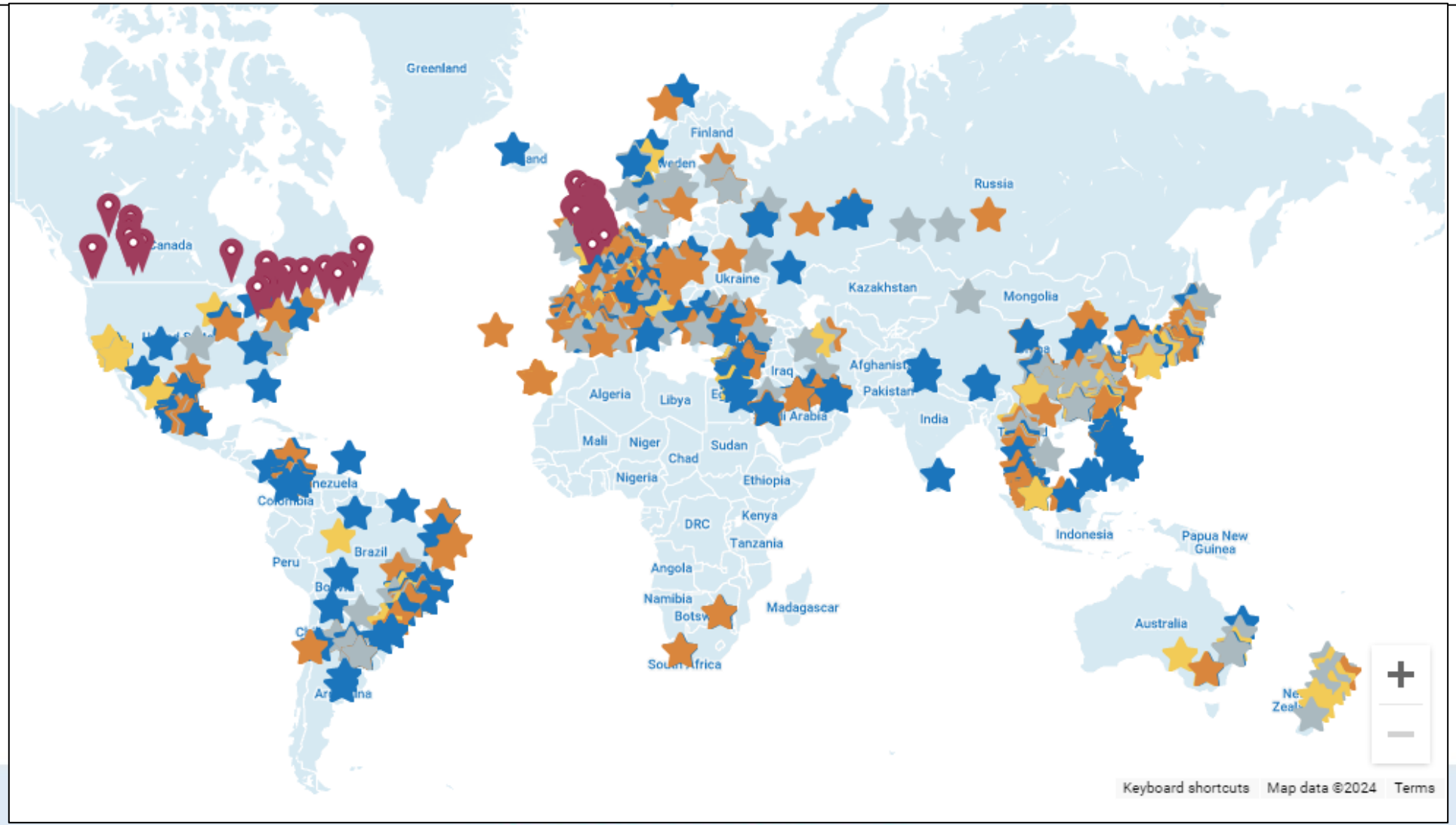
- A FLS systematically identifies, treats and refers to appropriate services all eligible patients aged over 50 years within a local population who have suffered a fragility fracture, with the aim of reducing their risk of subsequent fractures.

Main Services:

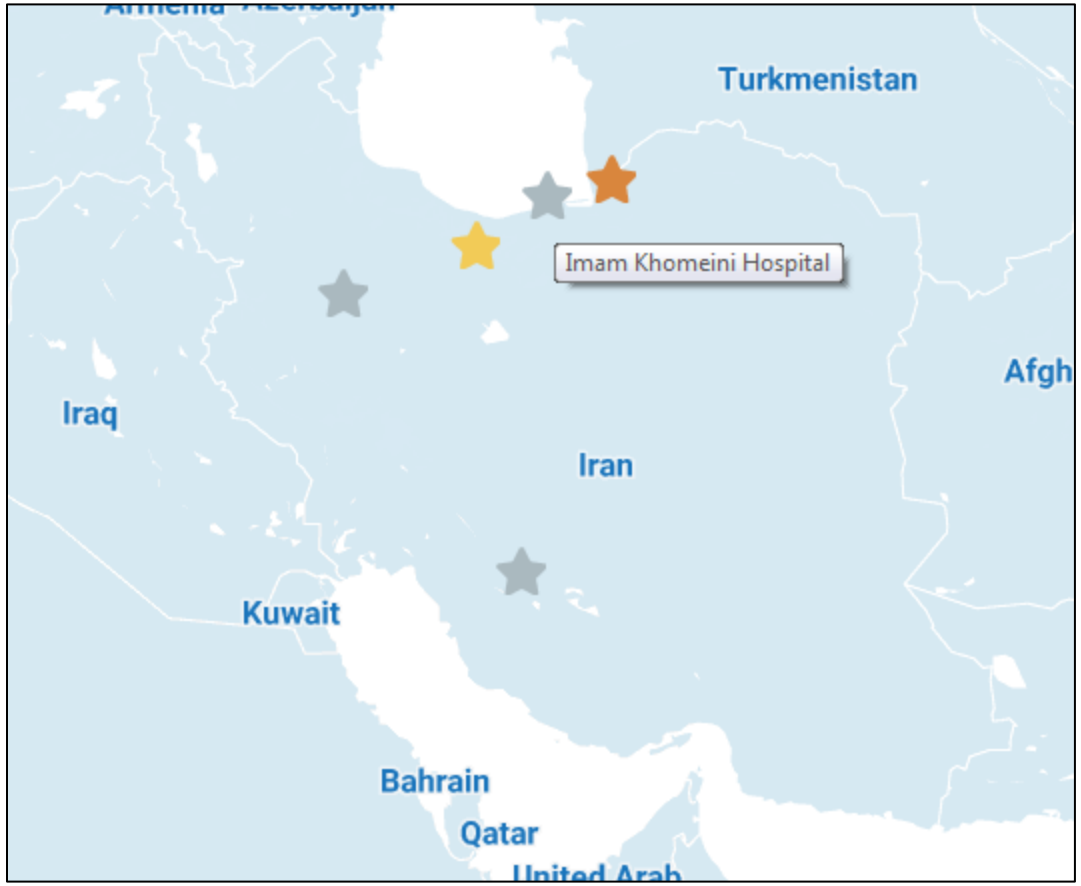
- Link to osteoporosis treatment
- Fall Prevention (training, risk assessment and refer to appropriate centers)
- Training:
  - ✓ reducing risk factors,
  - ✓ fall prevention,
  - ✓ improving the adherence to treatment
- Follow-up

Map of Best Practice

THE MAP OF BEST PRACTICE CURRENTLY DISPLAYS 1024 FRACTURE LIAISON SERVICES FROM 60 COUNTRIES



FLS in Iran


Turkmenistan
Imam Khomeini Hospital
Afgh
Iraq
Iran
Kuwait
Bahrain
Qatar


Turkmenistan
5th AZAR Hospital
Afghani
Iraq
Iran
Kuwait
Bahrain

FLS in Iran


Turkmenistan
Shafa Yahyaian Educational and Clinical Centre
Afghani
Iraq
Iran
Kuwait
Bahrain
Qatar
United Arab Emirates
Saudi Arabia


Turkmenistan
Besat General Hospital
Afghan
Iraq
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Turkmenistan
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Iran
Kuwait
Chamran Hospital
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Striving for a world without fragility fractures

Thank You For Attention