

Updates in the prevention of fractures

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ABSTRACT

Background

The prevention of fractures is multifaceted and relies on reorienting lifestyles and targeting persons with increased fracture risk. Following an earlier review in 2017, the International Osteoporosis Foundation (IOF) has provided several updates for fracture prevention.

Objectives

This bibliographic review will provide family doctors with the IOF's updates published on its website, noting changes to treatments and guidelines, addressing the prevention of fractures and discussing the new recommendations in the context of the Maltese healthcare system.

Method

The IOF website (<https://www.osteoporosis.foundation/>) was reviewed for guidance on preventing fractures from the 19th to the 27th of February 2023. The Scottish Intercollegiate Guidelines Network SIGN 2021 guidelines on managing osteoporosis and the UK Steady, Strong, Straight consensus statement were included. Updates in fracture prevention management were noted, and domestic practices and services available in the community were discussed.

Results

The IOF promotes bone health through educational means, lobbying, and developing strategies, such as the Scorecard for Osteoporosis in Europe (SCOPE), which compares EU countries

based on expenditure outcomes and accessibility to fracture prevention and management services. The review also emphasises using fracture risk calculators and densitometry to determine treatment and measure responses.

Conclusion

Strategies can reduce the risk of fractures by giving specific, measurable, and doable objectives to different stakeholders. For family doctors, this could involve community services in assessing the domestic milieu and improving access to social benefits and interventions. Home improvement measures improve both the risk and rate of falls while intervening on a personal level by improving physical and mental attributes to improve the rates of falls.

Keywords

Osteoporosis; fractures, bone; family practice; Malta

INTRODUCTION

The prevention of fractures remains multifaceted and relies on individually tailored practices by reorienting lifestyles and targeting persons with increased fracture risk. Following an earlier review in 2017 (Baldacchino and Baldacchino, 2017), the International Osteoporosis Foundation (IOF) has noted several updates in fracture prevention relevant to specialists in family medicine (International Osteoporosis Foundation, 2022).

This review will provide family doctors with the updates noted by the IOF on its website and secondary references provided. Its goals include:

- A review of the new treatments and guidelines.
- Addressing the prevention of fractures.
- To discuss the new recommendations in the context of the Maltese healthcare system.

METHOD

The IOF website (<https://www.osteoporosis.foundation/>) was reviewed for guidance on preventing fractures from the 19th to the 27th of February, 2023. The SIGN 2021 guidelines on managing osteoporosis and the UK Steady, Strong, Straight consensus statement were included (Shlisky, et al., 2021; Brooke-Wavell, et al., 2022).

Updates in fracture prevention management from the guidance provided by the IOF website and secondary references were noted, and domestic practices and services available in the community were subsequently discussed.

RESULTS

A summary of the key findings was drawn up in Table 1. The IOF promotes bone health through educational means, lobbying and devising strategies. Through multicentre collaboration, the IOF has developed the “scorecard for osteoporosis in Europe” (SCOPE), summarising expenditure outcomes and accessibility to fracture prevention and management services. The scorecard is relativistic in that it compares EU countries; there is no agreed range on what constitutes a high or low risk. Malta’s score shows good access to Dual X-ray Absorptiometry (DXA) scanning. Its population is generally in the middle range of FRAX (Fracture Risk Assessment Tool) risk and social policy interventions aimed at fracture prevention. Age-based prediction models place the Maltese population on the high end of future fracture projections (an increase of 47.7% by 2034). In 2019, this cost an average of 60 euros per person (Kanis, et al., 2021).

Table 1: Summary of key recommendations

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- Malta is in the middle range of FRAX (Fracture Risk Assessment Tool) risk for Europe.
 - Incidence of fractures is projected to increase by almost 50% by 2034.
 - Social workers are invaluable in assisting with the domiciliary setting.
 - Caucasians are at higher risk of fracture.
 - Vertebral fractures are not very symptomatic.
 - Home interventions improve fall rates and risk.
 - Medical interventions improve the rate of falls, not risk.
 - Vitamin D does not reduce fall rate or risk.
 - Thiazolidinediones increase urinary calcium excretion.
 - Vitamin D is recommended for persons taking anti-epileptics.
 - Fracture risk determines treatment.
 - Treatment is advised for the very high risk, and high risk.
 - Vitamin D and calcium intake should be considered for all at-risk groups.
 - Anabolic agents are first-line followed by an inhibitor of bone resorption for very high-risk groups.
 - High-risk groups can be offered oral bisphosphonates or bone resorption inhibitors.
 - Risedronate has more beneficial bone density outcomes than alendronate in men.
 - Teriparatide and zoledronic acid are recommended as first-line for spinal fractures.
 - Bone density measurements at three-year intervals after treatment started.
 - “Strong, Steady, Straight” exercises are recommended.
 - The very high risk, or cases with T-scores < -3.5, or vertebral fractures should be referred to secondary care.
 - Falls clinic referrals for those with > 1 fall in the previous year.
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Ethnic variations in fracture probabilities showed that Caucasians were at the highest risk of hip fractures, followed by the Indian population, coloured persons and black persons. Black persons had a four-fold lower probability of developing a hip fracture than their Caucasian counterparts. It was theorised that a biological advantage existed for Caucasians to require less calcium in their diet. At the same time, black persons had a greater capacity to absorb calcium and form thinner, denser bones (Kanis, et al., 2019; Shlisky, et al., 2022).

Gender-specific variations yield different frequencies of certain fractures. Men have been demonstrated to present with radiographic vertebral fractures more often at 55 to 59 years of age, while hip and wrist fractures are somewhat absent until the eighth decade. Women tend to have an exponential increase in the risk of radiographic vertebral fractures from 55 years of age, followed by a rise in the probability of wrist fractures at 80 (Sambrook and Cooper, 2006). Vertebral fractures in both groups tend to be less symptomatic, with a third exhibiting symptoms and 10% requiring hospitalisation for pain management (Lems, et al., 2017).

Diet and lifestyle

A Cochrane review in 2018 assessed how effective interventions were in preventing falls. Intervening in different areas reduced the rate of falls (relative risk (RR)=0.76; confidence interval (CI): 0.67-0.86) but not the risk of falling (RR=0.93; CI: 0.86-1.02). Vitamin D did not reduce the fall rate (RR=1.00; CI: 0.90-1.11) or the risk of falling (RR=0.96; CI: 0.89-1.03). The rate of falls (RR=0.81; CI 0.68-0.97) and risk of falling (RR=0.88; CI=0.80-0.96) were bettered by improving the home environment (Hopewell, et al., 2018).

The other dietary and lifestyle risk factors for osteoporosis included diabetes, obesity, proton pump inhibitors, anti-depressants, anti-epileptics, aluminium antacids and high salt intake. The introduction of thiazolidinediones (TZDs) in diabetes and their propensity to increase fracture risk by urinary calcium excretion was highlighted in the European guidance on the prevention of fractures. Vitamin D supplementation remains recommended for persons on anti-epileptic

treatment. So far, vitamin D supplementation has not shown an effect on cardiovascular status, and neither have treatment changes by family doctors to improve the risk of falls (Kanis, et al., 2019).

Fracture risk

Fracture risk calculators remain the mainstay for considering interventions in osteoporosis and fracture prevention. Fracture risk estimation methods remain prone to underestimating other clinical observations such as increased risks of falls, the type of previous fracture and the number, higher doses of steroid therapy and the risk of atypical femoral fractures. The new guidance also calls for considering a possible spinal fracture if a four-centimetre decrease in height is observed (Lems, et al., 2017).

DXA scans play a role in assessing responses to treatment at the care provider's discretion. Kanis, et al. (2019) commented on the treatment thresholds of 20% 10-year probability of a major osteoporotic fracture and 3% 10-year probability for a hip fracture that certain countries employed. The *raison d'être* for this observation was that the United States National Osteoporosis Foundation used these cut-offs as a cost-benefit strategy. The recommended approach was to treat those at very high risk of fracture and those considered high risk when densitometry was provided to intermediate-risk cases. The authors pointed out that a DXA scan was not indicated in very high-risk scenarios since a 20% gap in fracture probability would be present and would not significantly change management.

Treatment updates

The European group recommended that calcium and vitamin D status be addressed for all risk groups. In very high-risk groups, anabolic agents are considered the first line, followed by an inhibitor of bone resorption. In high-risk persons, oral bisphosphonates or bone resorption inhibitors may be considered (Kanis, et al., 2019). First-line oral bisphosphonate treatment for men now shifts to a "may consider" position by SIGN to risedronate over alendronate following a more beneficial effect on bone density outcomes and little benefit noted on fracture risk outcomes.

At the same time, zoledronic acid was given a “should consider” role in male osteoporosis (Shlisky, et al., 2021).

The European guideline group recommended teriparatide or zoledronic acid for persons with a spinal fracture as first-line alternatives. Duration of treatment also varies, with risedronate recommended for a total of seven years, zoledronic acid for three years, denosumab for five to ten years, and teriparatide recommended for a maximum of two years. Treatment response assessment by DXA scan for inpatient comparison of lumbar spine density was recommended after a minimum of three years (Lems, et al., 2017).

Treatment with a bisphosphonate following teriparatide, denosumab, and romosozumab (a monoclonal antibody directed at osteoclastin) is recommended since benefits from anabolic agents are short-lived compared to bone resorption inhibitors (Lems, et al., 2017).

Exercise

The UK consensus statement on physical activity and exercise for osteoporosis recommends three varieties of exercise prescription for persons with osteoporosis:

- For persons prone to falls, the “steady” programme recommends strengthening muscle, gait and balance skills.
- In persons with vertebral fractures and back pain, the “straight” programme strengthens back musculature to improve kyphotic posturing. Practical advice on how to load the spine is also given.
- For persons who do not have spinal and mobility difficulties, muscle strengthening and impact exercises for bone strength are carried out (Brooke-Wavell, et al., 2022).

Referral

The National Osteoporosis Guideline Group (2021) in the UK recommends referral to secondary care in five scenarios:

- Those persons at very high risk.
- Those who suffered multiple fragility fractures.
- In cases with a very low T-score finding (<-3.5).
- The presence of recent or multiple vertebral fractures.
- In persons with multiple risk factors.

Fracture liaison services

The IOF also advocates using fracture liaison services (FLS) to provide better care to persons with post-fragility fractures. FLS have been observed to decrease institutional referrals, hospital bed stays, and the need to go to clinics. An FLS coordinator receives the notification of a fracture in persons over 50 years, having a spinal fracture, or suffering a fracture while on treatment for osteoporosis. The coordinator investigates the cause of the fracture by assessing a person’s health and risk of falls by 12 weeks. They liaise with community and secondary care services to deliver fracture risk and fall risk assessments. Patients and their carers are educated, treatment is offered, and follow-ups are carried out at 16 and 52 weeks. FLS services also meet with other professionals to discuss strategies and improve the service (Gallacher, et al., 2019).

DISCUSSION

The IOF's vertical approach to preventing fractures involves a strategy for European countries to coordinate efforts at a domestic level. This means that the ethnographic needs of patients that Maltese family doctors face daily must be considered when interpreting the SCOPE scorecard (Kanis, et al., 2021).

By 2034, Malta expects an almost 50% increase in osteoporotic fractures (4,700 incidental fractures), emphasising the need to invest in education, auditing, prevention, and treatment services. In 2016, almost half of patients sustaining low-energy hip fractures were on calcium and vitamin D supplementation, but only 2.64% were on antiresorptive therapy (International Osteoporosis Foundation, 2022).

Unfortunately, strategic post-operative community care of hip fractures and fragility fracture capture remains elusive. These events provide family doctors with a surrogate marker of osteoporosis status and may allow family doctors to make a difference after patients are discharged from rehabilitation services.

The emerging role of TZDs is also receiving attention from the Maltese medical community and has found its way into the government outpatient formulary list along with combined vitamin D – calcium preparations (Directorate for Pharmaceutical Affairs, 2023). This availability presents an increasing requirement for dietary calcium in patients taking TZDs.

Spinal fractures and very low T-scores (<-3.5) have attracted anabolic therapies and zoledronic acid as first-line measures by the IOF. The drawback to using teriparatide and denosumab is that their effects last a few years, and this initial phase might have to be governed by secondary care. The changeover to a bisphosphonate afterwards retains the improvement in bone density (Kanis, et al., 2021).

The national health service Primary HealthCare physiotherapy clinics around the islands also provide falls-assessment clinics that assist in exercises that prevent falls and how to manage falls and get up. They also offer vestibular rehabilitation exercises. This follows the advice given by the “Strong, Steady, and Straight” recommendations (Brooke-Wavell, et al., 2022).

Patients with complex conditions, such as Parkinson's, are directed to specialised services for a comprehensive evaluation. Falls clinic interventions are still recommended for those who have fallen more than once in the previous year. This translates into multidisciplinary involvement of occupational therapists, physiotherapists, geriatric services, sports clinics, orthopaedic inputs and other disciplines (National Osteoporosis Guideline Group, 2021).

Family doctors, however, retain their role as specialists in their patients' lives. Following a fracture, one may have significant changes in one's life and identity. Social workers are invaluable in such cases and must be engaged by family doctors to ameliorate domiciliary living conditions.

Limitations

The national scenario remains unexamined with no official data on how many patients receive antiresorptive therapy and dietary supplementation for osteoporosis.

This research only focuses on the recommendations of the IOF. Readers may consider other sources of information on public policy and medicine concerning osteoporosis.

Each patient scenario has its own clinical details that make a difference on how treatment is managed. Other professionals, such as social workers, intervene with different targets according to their professional competencies and the patient's needs.

CONCLUSION

The IOF recommended implementing strategies to reduce the risk of fractures by giving stakeholders specific, measurable, and doable objectives emphasising dietary, pharmacological, and domiciliary interventions.

Bisphosphonates are recommended as a follow-up therapy to the improvements in densitometry gained by anabolic agents recommended for very high-risk individuals.

Domestic interventions improve the risk and rate of falls while intervening personally by improving physical and mental attributes to

prevent falls. As stewards of their patient's health, Maltese family doctors should be educated on what community services they can avail themselves of to assess and intervene in patients' domestic milieu and improve access to social benefits and interventions.

A strategy would be needed to handle efficiently the multiple stakeholders involved. It may incorporate a FLS that can follow cases earlier and prevent complications. Such a strategy would include an audit system that picks up outcomes and establishes a feedback cycle for self-improvement with stakeholders.

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