Osteoporosis in primary care

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Introduction
Bone health affects every generation in our communities. From the youngest to the oldest patients, their bone is constantly remodelling by resorbing old bone and forming new bone. Interestingly, we obtain a whole new skeleton every seven years. During adolescence bone formation is greater than resorption causing the trabecular like honeycomb structures within to thicken and strengthen. Many factors will influence this such as lifestyle, diet and exercise. This process plateaus in early adult life. During an adult’s third decade, bone begins to thin out.

Age related bone loss is between 0.5-1.0% of bone thickness each year. There is a natural decline in bone strength as we age. It should be highlighted that osteoporosis can affect anyone at any age. This can be due to other conditions causing an increase in bone loss. The disease affects both men and women. Bone loss is an asymptomatic process giving osteoporosis a nickname ‘the silent disease’. The most common symptom is a fracture. Incidence of the disease increases with age. In Ireland one in three women and one in five men over the age of 50 have osteoporosis. Osteoporosis can affect all bones within the skeleton. Most common sites for osteoporotic fracture are hips, spine, wrist and humerus.

Risk factors
There are numerous established risk factors for identifying people at risk of osteoporosis and fragility fractures.

Increasing age sees increasing bone loss, causing bone to become more fragile. Family history plays a significant role in bone health with 80 per cent of bone strength determined by parents.

Due to the menopause, women are at a higher risk of osteoporosis. An early menopause can contribute to lower bone loss at an earlier age. Women lose the benefit of oestrogen to bone. Bone loss accelerates to almost double following this change and can last for 5-10 years.

A history of eating disorder at any age can deprive bone of vital nutrients. This could have a significant impact on bone development at a vital stage such as adolescence.

Conditions that can impair absorption of nutrients can increase risk for fragility fracture and osteoporosis such as coeliac disease, ulcerative colitis and Crohn’s disease. Chronic liver and kidney dysfunction contribute to increased bone loss. With significant changes in the management of rheumatoid arthritis and reduced reliance on steroids, the disease carries a high risk of fracture.

Hormonal imbalances such as high levels of prolactin, cortisol, elevated thyroid/parathyroid and hypogonadism lead to increased bone loss. Type 1 diabetes carries a risk for lower bone mass and high risk for fracture.

Previous fragility fracture is a potent risk for a future fragility fracture.

Medications can increase risk of bone loss: corticosteroids, certain anticonvulsants, loop diuretics, warfarin and androgen deprivation therapy. Bone density should be considered prior to chemotherapy and radiotherapy.

Furthermore lifestyle risks include; cigarette smoking, alcohol intake greater than 2iu daily, inadequate dietary calcium, low body weight (less than 56kg/8stone 8 pound), recurrent falls, sedentary lifestyle, hypogonadism and malabsorption. To date there is weak evidence to support changes in lifestyle that will improve fracture outcomes.

Diagnosis
This chronic illness is the most common musculoskeletal condition. Key to managing this chronic condition is detection of risks and identifying patients who may be more susceptible to the condition.
Un fortunately pa tients not identified with fragility fractures can enter a revolving door for future fractures.

Osteop ora is a slow loss of bone mass that leads to lower bone mass (osteopenia) and contribut o r to low bone mass such as secondary causes of osteoporosis. Fragility fractures are a result of osteoporosis within bone and considered to carry a higher risk for fragility fractures. This is due to low bone mass and micro-architectural deterioration of bone tissue with a consequent increase in bone fragility. A fragility fracture is described as a fracture sustained from a fall at standing height or less (fall from seated position). Even force applied that is not excessive could be considered fragility (coughing or sneezing). This type of fracture can be considered a diagnosis of osteoporosis. A reason for this is that fracture is a health outcome and density is a risk factor for fracture. Low bone mass (osteopenia) will carry a risk for future fracture. Key to understanding bone health is that more than half of older women that fracture do not have osteoporosis.

Why should fractures be prevented?

There are a number of reasons why we should try to prevent fractures including the fact that while we have longer life expectancy, fractures can increase morbidity and mortality by 20% and contribute to loss of independence.

Morbidity and mortality

A hip fracture occurs every 30 seconds in Europe. It is associated with chronic pain, reduced mobility, disability, and increasing levels of dependence. Some 10-20% of community dwelling patients require long-term nursing home placement as a result of same and less than half of this patient group regains previous levels of function. Up to 20% of these patients die in the first year, mostly due to pre-existing medical conditions. A more silent and sinister fracture is that of the thoracic or lumbar vertebra. Research suggests only one third of vertebral fractures come to clinical attention. This fracture carries the highest risk for a future fracture by one third. Developing a hunched back and protruding head places additional physical and psychological demands on our bodies. This can include reduced pulmonary function, as the chest cavity is pushed down on the upper abdominal cavity, leading to a distended abdomen and constipation. Furthermore, body shape will change leading to low self-esteem, altered gait, with a higher risk of falls, and fear of falling. Unfortunately height loss greater than 2cm may be a sign of collapsing vertebra.

Quality of life

Osteoporosis can have a significant impact on a person’s quality of life. Imagine feeling lost, isolated and unable hold the people you love. In gripping research undertaken by the National Osteoporosis Society, this is a reality for people living with osteoporosis.

Non-pharmacological treatment

Dietary

Recommendations suggest 1200mg of calcium for women over 50 and 1000mg of calcium for men over 50 with 800iu of vitamin D for both. Ideally calcium should be sought through dietary sources, which can be difficult. Calcium supplements are beneficial but time consuming. Balance could be sought between half strength calcium supplementation and dietary sources. Some dairy produce is fortified with vitamin D. Due to Ireland’s latitude we only produce vitamin D in summer months. When testing vitamin D there is no consensus for optimal level, although >50nmol/L would be considered sufficient all year round.
Some literature would report an optimal level of >75nmol/L. An adequate level of vitamin D can increase calcium absorption up to 80%. Levels should be established prior to bone protection treatment. Consider high dose replacement for deficient patients <25nmol/L. Holick et al (2011) recommend Cholecalciferol 50,000iu weekly for six to eight weeks. Consider reassessment of level at three months. Once a patient is compliant and there is not any risk for deficiency, repeat levels are not required.

**Lifestyle**

Exercise should be recommended for prevention of osteoporosis and to those with osteoporosis. There is no evidence to suggest high intensity activity such as running has a greater benefit. The most important aspect of exercise should be enjoyment to encourage long-term compliance. Exercise such as brisk walking will benefit bones as will following the national recommendations of 30 minutes five days a week. Combination programmes with resistance training have been shown to benefit bone. Smoking cessation can have positive impacts too as smoking accelerates bone loss. Every effort should be made to encourage cessation. Bone density had been shown to reduce by 5 to 10% when smoking 20 cigarettes daily in adult life.

**Pharmacological treatments**

Bone protection treatment should be offered to patients with osteoporosis diagnosed by DXA or who sustained a fragility hip or thoracic/lumbar vertebral fracture. Patients with FRAX absolute fracture risk of greater than 3% for hip and 20% for major osteoporotic fractures (wrist, humerus or vertebral) with low bone mass, diagnosed by DXA, are criteria for treatment. There is an absence of high quality head to head fracture risk-assessment and densitometry. Patients must be aware of level at three months. Once a patient is compliant and there is <25nmol/L. Holick et al (2011) recommend Cholecalciferol treatment. Consider high dose replacement for deficient patients importantly have impaired kidney function. Considered a potent bone inhibitor. Baseline calcium level should be obtained and corrected prior to administration. Check calcium 10 days after administration if creatinine clearance < 30ml/min.

**Teriparatide analogue**

The only true bone builder is teriparatide analogue, which stimulates formation of osteoblasts. This treatment is for severe cases of osteoporosis. Particularly effective at preventing vertebral fractures and anecdotally reduce back pain related to vertebral fractures.

**Conclusion**

Key to prevention, detection and management is knowing risks for fragility fractures. Initial risk calculation can stratify risk to counsel patients. Modify lifestyle where possible. Minimise risk further with bone protection treatment where appropriate.

**References**