

Osteoporosis Risk Assessment and Primary Prevention

Osteoporosis is characterised by low bone mineral density (BMD) and deterioration of bone structure, resulting in an increased susceptibility to fractures of the hip, spine, and wrist.^[1]

- Based on measures of BMD in Caucasians, osteoporosis is present in 15% of those aged 50-59 years, but these figures increase quickly to 70% of those aged over 80 years.
- The most costly result of osteoporosis is the hip fracture, which nearly always requires hospitalisation, is fatal 20% of the time and permanently disables a further 50%; only 30% fully recover.
- 1.7 million hip fractures occurred worldwide in 1990; this figure is expected to rise to 6 million by 2050.^[1]

Primary Care is ideally situated to try to identify patients at increased risk before symptoms develop, whilst both orthopaedic surgeons and Primary Care should be vigilant to assess all patients with suspected fragility fractures. There are several risk factors which often co-exist to increase risk substantially.

Primary Care surgeries might identify all reported cases of fractures (hip, pelvic, vertebral, humeral or wrist) from discharge summaries and perform a risk assessment on these patients. Applying the National Institute for Health and Clinical Excellence (NICE) osteoporosis guidelines to these patients, those <75 years of age may be referred for a DEXA scan, whereas those over this age with definite fragility fracture can be assumed to have osteoporosis and be treated anyway.

Risk factors^[2]

As far as 'case finding' is concerned - consider doing full assessments and/or BMD dual-energy X-ray absorptiometry (DEXA) scans on patients with one or more risk factors:^[3]

- Known low BMD (DEXA at spine or hip).
- Prior **vertebral fracture** or fragility fracture.
- Long-term glucocorticoid treatment.
- **Rheumatoid arthritis**.
- Other secondary cause of osteoporosis: **type 1 diabetes**, **osteogenesis imperfecta** in adults, **anorexia nervosa**, **hyperparathyroidism**, untreated long-standing hyperthyroidism, hypogonadism or **premature menopause** (<45 years), chronic **malnutrition** or **malabsorption** (eg, **coeliac disease**, **inflammatory bowel disease**) and **chronic liver disease**
- Family history of osteoporosis (maternal, paternal and sisters - including history of fragility fractures in those aged >50).^[4]
- Low BMI (particularly in postmenopausal women).
- Alcohol intake >3 units per day.^[3]
- Cigarette smoker.
- Long-term anticonvulsant therapy (phenytoin, phenobarbital and carbamazepine).^[5]

Case finding

An absolute 10-year risk of fracture may be obtained via FRAX® risk assessments^[3] and the QFracture® calculator (an alternative based on the UK population).^{[6] [7]}

Search the practice database to identify all patients on long-term glucocorticoids, those with chronic liver disease, and those with type 1 diabetes and assess osteoporosis risk on these patients as well.^[3]

Consider osteoporosis risk during the annual reviews of other chronic diseases (eg, coronary heart disease, hypertension, etc).

National Institute for Health and Clinical Excellence recommendations

The NICE guidance for assessing the risk of a fragility fracture recommends:^[8]

- Consider assessment of fracture risk: in all women aged 65 years and over and all men aged 75 years and over; in women aged under 65 years and men aged under 75 years in the presence of risk factors, for example:
 - Previous fragility fracture.
 - Current use or frequent recent use of oral or systemic glucocorticoids.
 - History of falls.
 - Family history of hip fracture.
 - Other causes of secondary osteoporosis.
 - Low body mass index (less than 18.5 kg/m²).
 - Smoking.
 - Alcohol intake of more than 14 units per week for women and more than 21 units per week for men.
- Do not routinely assess fracture risk in people aged under 50 years unless they have major risk factors (eg, current or frequent recent use of oral or systemic glucocorticoids, untreated premature menopause or previous fragility fracture), because they are unlikely to be at high risk.
 - Estimate absolute risk when assessing risk of fracture (for example, the predicted risk of major osteoporotic or hip fracture over 10 years, expressed as a percentage).
 - Use either FRAX® (without a bone mineral density value if a DEXA scan has not previously been undertaken) or QFracture®, within their allowed age ranges, to estimate 10-year predicted absolute fracture risk when assessing risk of fracture. Above the upper age limits defined by the tools, consider people to be at high risk.
 - Interpret the estimated absolute risk of fracture in people aged over 80 years with caution, because predicted 10-year fracture risk may underestimate their short-term fracture risk.
 - Do not routinely measure BMD to assess fracture risk without prior assessment using FRAX® (without a BMD value) or QFracture®.
 - Following risk assessment with FRAX® (without a BMD value) or QFracture®, consider measuring BMD with DEXA in people whose fracture risk is in the region of an intervention threshold for a proposed treatment, and recalculate absolute risk using FRAX® with the BMD value.
 - Consider measuring BMD with DEXA before starting treatments that may have a rapid adverse effect on bone density (for example, sex hormone deprivation for treatment for breast or prostate cancer).
 - Measure BMD to assess fracture risk in people aged under 40 years who have a major risk factor, such as history of multiple fragility fracture, major osteoporotic fracture, or current or recent use of high-dose oral or systemic glucocorticoids (more than 7.5 mg prednisolone or equivalent per day for three months or longer).
 - Consider recalculating fracture risk in the future: if the original calculated risk was in the region of the intervention threshold for a proposed treatment and only after a minimum of two years, or when there has been a change in the person's risk factors.
 - Take into account that risk assessment tools may underestimate fracture risk in certain circumstances - for example, if a person: has a history of multiple fractures, has had previous vertebral fracture(s), has a high alcohol intake, is taking high-dose oral or high-dose systemic glucocorticoids, (more than 7.5 mg prednisolone or equivalent per day for three months or longer) or has other causes of secondary osteoporosis.
 - Take into account that fracture risk can be affected by factors that may not be included in the risk tool - for example, living in a care home or taking drugs that may impair bone metabolism (such as anticonvulsants, selective serotonin reuptake inhibitors, thiazolidinediones, proton pump inhibitors and antiretroviral drugs).

Interventions

Patients found to be at increased risk of fracture should be offered a bone-preserving agent, depending on the agreed threshold. The National Osteoporosis Guideline Group (NOGG) suggests interventions according to the patient's risk^[9] - click on the NOGG button available after using the FRAX® calculator. See separate article [Osteoporosis](#) for discussion on treatments.

Primary prevention

Diet and exercise have a considerable influence on whether patients go on to develop osteoporosis:^[10] [11]

- The patient should be encouraged to take adequate calcium throughout life. Where intake may be suboptimal, provide supplementation with calcium and vitamin D3 (particularly for patients with low BMI and patients in residential and nursing homes).
- Calcium-rich foods include milk and dairy products (can be reduced-fat) and vegetables such as broccoli and cabbage.
- The healthy eating diet, with '5 a day' of fruit and vegetables (vitamin C), fish meals at least weekly (vitamins D and K^[12]), is a good start.
- Encourage a reduced salt and phosphate intake, and the moderation of alcohol intake; give anti-smoking advice as appropriate.
- Encourage exercise, both traditional weight-bearing exercise, and exercise that involves pulling forces acting on entheses (tendon insertions) of long bones.

Primary prevention of fragility fractures in established osteoporosis is covered in the [Osteoporosis](#) article.

Further reading & references

- [Osteoporosis - primary prevention](#), NICE Technology Appraisal Guideline (January 2011)
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 2. [WHO Scientific Group on the Assessment of Osteoporosis at Primary Health Care Level](#), World Health Organization, 2004
 3. [WHO Fracture Risk Assessment Tool \(FRAX®\)](#), World Health Organization Collaborating Centre for Metabolic Bone Diseases
 4. [Management of osteoporosis](#), Scottish Intercollegiate Guidelines Network - SIGN (2004)
 5. [Sheth RD; Metabolic concerns associated with antiepileptic medications](#). *Neurology*. 2004 Nov 23;63(10 Suppl 4):S24-9.
 6. [QFracture® - risk calculator for hip fracture or osteoporotic fracture](#); (hip, vertebral, or distal radius fracture) over the next 10 years
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 9. [Guideline for the diagnosis and management of osteoporosis in postmenopausal women and men from the age of 50 years in the UK](#), National Osteoporosis Guideline Group (October 2008, updated July 2010)
 10. [Clinician's Guide to Prevention and Treatment of Osteoporosis](#); National Osteoporosis Foundation (2010)
 11. [Stransky M, Rysava L; Nutrition as prevention and treatment of osteoporosis](#). *Physiol Res*. 2009;58 Suppl 1:S7-S11.
 12. [Stevenson M, Lloyd-Jones M, Papaioannou D; Vitamin K to prevent fractures in older women: systematic review and economic Health Technol Assess](#). 2009 Sep;13(45):iii-xi, 1-134.

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