**Guidelines on Osteoporosis and fragility fractures**

**Prepared By: Dr. Md. Sajid Bin Ashraf Sami**

**Introduction**

Osteoporosis is a disease characterised by low bone mass and structural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture. Osteoporosis leads to nearly 9 million fractures annually worldwide (Johnell and Kanis, 2006), and over 300,000 patients present with fragility fractures to hospitals in the UK each year

The conceptual definition of osteoporosis was made by the World Health Organization (WHO) in 1994 as a “progressive systemic skeletal disease characterized by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture”. Since microarchitectural deterioration could not be measured clinically, the operational description was based on a bone mineral density (BMD) T-Score of ≤-2.5.

The clinical significance of osteoporosis lies in the fractures that arise. In adults, approximately one in two women and one in five men will sustain one or more fragility fractures (a low trauma fracture sustained from a fall from standing height or less) in their lifetime . In the UK, the prevalence of femoral neck BMD T-Score ≤-2.5, in those aged 50 years and older, is 6.8% in men and 21.8% in women

Common sites of fragility fracture include the vertebral bodies, hip, distal radius, proximal humerus and pelvis. Hip fracture is the most common reason for emergency anaesthesia and surgery in older people. It is also the most common cause of death following a fall. Such fractures cause severe pain, disability, and reduction in quality of life .

**Assessment of fracture risk in postmenopausal women, and men age ≥50:**

1. **Conduct a**[**FRAX assessment**](https://fraxplus.org/calculation-tool)**in people with a**[**clinical risk factor**](https://www.nogg.org.uk/full-guideline/section-3-fracture-risk-assessment-and-case-finding#table-4)**for fragility fracture.**

Clinical risk factors included specifically in the FRAX assessment of fracture probability

|  |
| --- |
|  |
| * Age |
| * Sex |
| * Body mass index (calculated from weight and height in kg/m2) |
| * Previous fragility fracture, including morphometric vertebral fracture |
| * Parental history of hip fracture |
| * Current glucocorticoid treatment (any dose, by mouth r 3 months or more) |
| * Current smoking |
| * Alcohol intake 3 or more units daily |
| * Rheumatoid arthritis |
| * Secondary causes of osteoporosis including: |
| * + - Type 1 diabetes |
| * + - Long-standing untreated hyperthyroidism |
| * + - Untreated hypogonadism/premature menopause ( |
| * + - Chronic malnutrition/malabsorption |
| * + - Chronic liver disease |
| * + - Non-dialysis chronic renal failure (i.e., CKD 3a – 5) |
| * Femoral neck BMD |

1. **Measure BMD in people with intermediate fracture risk by FRAX**  to refine the estimate of 10-year risk.
2. **Measure BMD in people with high and very high fracture risk by FRAX**  to guide drug choice and provide a baseline for BMD monitoring.
3. **Consider**[**imaging to look for a vertebral fracture**](https://www.nogg.org.uk/full-guideline/section-3-fracture-risk-assessment-and-case-finding#vertebral)**in people with acute onset back pain who have risk factors for osteoporosis**, and/or in people with a history of ≥4cm height loss, kyphosis, recent or current long-term oral glucocorticoid therapy, or a BMD T-score ≤-2.5.
4. **Assess falls risk in patients with osteoporosis and/or fragility fractures and offer those at risk an** [exercise programme to improve balance and muscle strength.](https://www.nogg.org.uk/full-guideline/section-5-non-pharmacological-management-osteoporosis#falls)

Additional clinical risk factors have been identified that provide information on fracture risk independently of both age and BMD:

* Low body mass index (BMI)
* A history of a prior fracture,
* A parental history of hip fracture is a significant risk factor that is largely independent of BMD
* Smoking is a risk factor that is in part dependent on BMD
* Oral glucocorticoid therapy increases fracture risk in a dose-dependent manner.
* Alcohol intake.
* There are many secondary causes of osteoporosis (e.g., inflammatory bowel disease, endocrine disorders), but in most instances, it is uncertain to what extent an increase in fracture risk is dependent on low BMD or other factors such as the use of glucocorticoids. By contrast, rheumatoid arthritis increases fracture risk independently of BMD and the use of glucocorticoids
* Diabetes mellitus (both type 1 and type 2)

**Investigation of osteoporosis and fragility fractures**

 Proposed clinical investigations to consider for the investigation of osteoporosis/ fragility fractures.

| **Routine** |
| --- |
| * Clinical history * Physical examination including measurement of height and assessment of thoracic kyphosis * Full blood cell count * Erythrocyte sedimentation rate or C-reactive protein * Renal function * Serum calcium, albumin, creatinine, phosphate, alkaline phosphatase and liver transaminases * Serum 25-hydroxyvitamin D * Thyroid function tests |
| **Other procedures, if indicated** |
|  |

* Serum electrophoresis, serum immunoglobulins and serum free light chain assay
* Plasma parathyroid hormone (PTH)
* Serum testosterone, sex hormone binding globulin, follicle stimulating hormone, luteinizing hormone
* 24-hour urinary free cortisol/overnight dexamethasone suppression test
* Serum prolactin
* Serum magnesium if hypocalcaemic
* Tissue transglutaminase antibodies, +/- endomysial antibodies (coeliac disease screen)
* Urinary calcium excretion
* Markers of bone turnover (e.g., CTX, P1NP)
* Lateral radiographs of lumbar and thoracic spine or DXA based lateral vertebral imaging
* Bone densitometry (DXA) if indicated by FRAX assessment and/or required for BMD monitoring
* Isotope bone scan

**Non-pharmacological management of osteoporosis**

Postmenopausal women, and men age ≥50 years, with osteoporosis or who are at risk of fragility fracture are recommended:

1. A healthy, nutrient-rich balanced diet
2. An adequate intake of calcium (minimum 700mg daily) preferably achieved through dietary intake or otherwise by supplementation
3. To consume vitamin D from foods or be prescribed vitamin D supplements of at least 800IU/day if they have identified vitamin D insufficiency or risk factors for vitamin D insufficiency. Those who are either housebound or living in residential or nursing care are more likely to require calcium and vitamin D supplementation to achieve recommended levels of intake
4. A combination of regular weight-bearing and muscle strengthening exercise
5. Advice about smoking cessation if an individual is a smoker
6. Advice to restrict alcohol intake to ≤ 2 units/day .

**Pharmacological treatment options**

**Recommendations**

Fracture risk assessment, patient suitability and preference should inform the choice of drug treatment. In most people at risk of fragility fracture, anti-resorptive therapy is the first-line option

***Antiresorptive drug treatment***

* Offer oral bisphosphonates (alendronate or risedronate) or intravenous zoledronate as the most cost-effective interventions. Alternative options include denosumab, ibandronate, hormone replacement therapy, raloxifene and strontium ranelate.
* Offer intravenous zoledronate as a first-line treatment option following a hip fracture
* Consider offering younger postmenopausal women (age ≤ 60 years) with high fracture risk, and low baseline risk for adverse malignant and thromboembolic events, HRT as a first-line treatment option

***Anabolic drug treatment***

* Consider teriparatide, abaloparatide or romosozumab as first-line treatment options in postmenopausal women at very high fracture risk, particularly in those with vertebral fractures.
* Consider as second-line treatment options, teriparatide in postmenopausal women, and men age 50 years and older, and abaloparatide or romosozumab in postmenopausal women, who are intolerant of bisphosphonate treatment, particularly in those with vertebral fractures.
* Consider raloxifene as an option for follow-on treatment after an anabolic drug in women

***Other treatments***

* When other antiresorptive and anabolic treatments are contraindicated or not tolerated, strontium ranelate can be used to treat postmenopausal osteoporosis and men with severe osteoporosis, provided the risk-benefit in relation to cardiovascular and thromboembolic events is considered. Initiation by a specialist who is an expert in osteoporosis management is advised
* Offer calcium and/or vitamin D supplementation as an adjunct to anti-osteoporosis drug treatment, if dietary calcium is low and/or vitamin D insufficiency is a risk, respectively
* Treat vitamin D deficiency and insufficiency prior to initiation of parenteral anti-osteoporosis drug treatment, and alongside initiation of oral anti-osteoporosis drug treatment

**References**

1. Compston J, Cooper A, Cooper C, et al. Guidelines for the diagnosis and management of osteoporosis in postmenopausal women and men from the age of 50 years in the UK. Maturitas 2009; 62(2): 105-8.
2. Compston J, Bowring C, Cooper A, et al. Diagnosis and management of osteoporosis in postmenopausal women and older men in the UK: National Osteoporosis Guideline Group (NOGG) update 2013. Maturitas 2013; 75(4): 392-6.
3. Compston J, Cooper A, Cooper C, et al. UK clinical guideline for the prevention and treatment of osteoporosis. Arch Osteoporos 2017; 12(1): 43.
4. NICE guidelines on Osteoporosis: assessing the risk of fragility fracture.Clinical guideline ,Reference number: CG146, Published: 08 August 2012