



# Osteoporosis

## Identification and management in primary care

### Key messages

- 1 **Assess** osteoporosis risk in post-menopausal women, and men 65 years and older.
- 2 **Diagnose** osteoporosis in patients with a fragility fracture or DXA BMDT-score  $\leq -2.5$ .
- 3 **Treat** patients diagnosed with osteoporosis, or patients with osteopaenia and high fracture risk.
- 4 **Refer** selected patient groups to a specialist only when necessary.

### Early identification is key to reducing fragility fractures

Osteoporosis is a skeletal disease in which bone density and quality are reduced. Unrecognised or untreated osteoporosis increases fracture risk. Patients suffering hip or spine fractures need long hospitalisations and repeated rehabilitation. Also, these fractures lead to reduced ability to live actively, productively, and independently.

As osteoporosis is often asymptomatic until the patient presents with a fragility fracture (a fracture that occurs as a result of minimal trauma, or no identifiable trauma), early identification of patients at

risk is key to fracture prevention.<sup>1</sup> Many factors influence an individual's likelihood to develop osteoporosis, with age and gender playing key roles.<sup>2,3</sup> A careful assessment of the patient's risk profile is needed to identify the need for bone mineral density assessment (BMD) using dual energy X-ray absorptiometry (DXA). Low BMD defines presence of osteoporosis, but other elements also have an effect on the risk of fragility fractures. In primary care, recognising the patient's risk of osteoporosis or fragility fractures can enable appropriate diagnosis and management, keeping the patient fracture-free.

## Identifying patients at risk

Recognising patients with osteoporosis risk or high fracture risk is key in identifying those who will benefit from further evaluation, counselling, and treatment. As age and gender are well-established osteoporosis risk factors, the risk profile of **post-menopausal women, and men 65 years and older<sup>a</sup> should be further assessed**. Several risk factors are known to be associated with osteoporosis and fragility fractures (Table 1).

Table 1. Risk factors for osteoporosis or fragility fractures

Family history of osteoporosis or fragility fractures	Certain medications <sup>^</sup>
Previous fragility fracture	Low calcium intake (<500 mg/day)*
Ageing	Excessive alcohol intake (>2 units/day)
Low body weight	Smoking (any)
Height loss (>2 cm within three years)	Prolonged immobility
Early menopause (45 years and younger)	History of falls
Presence of diseases that can lower bone density or increase fracture risk <sup>#</sup>	

<sup>^</sup> Such as prolonged corticosteroid use (>5 mg/day of prednisolone or its equivalent for >3 months in the past year)

\* Calcium intake calculator: [www.healthhub.sg/live-healthy/216/calcium\\_greater\\_bone\\_strength](http://www.healthhub.sg/live-healthy/216/calcium_greater_bone_strength)

<sup>#</sup> Such as diabetes mellitus, or any inflammatory rheumatic disease

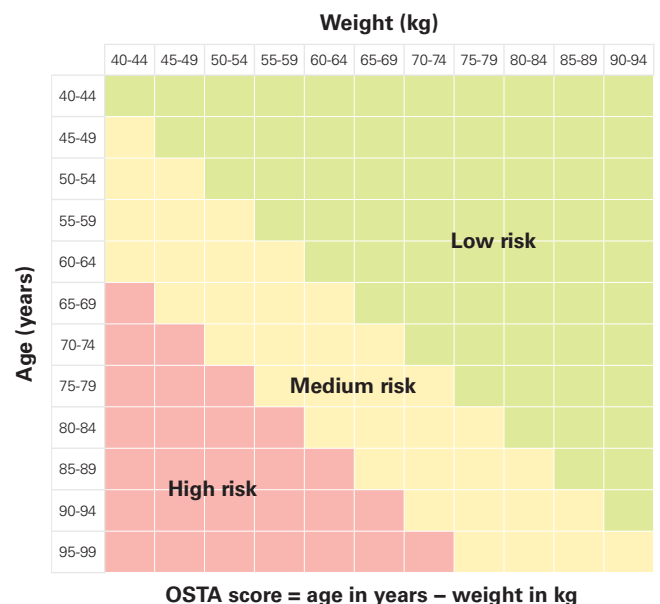
**When assessment is conducted in post-menopausal women**, the Osteoporosis Self-Assessment Tool for Asians (OSTA) can support detecting a woman's osteoporosis risk.<sup>4</sup>

Based on the woman's risk as per the coloured chart:

- **High-risk (>20)** → consider DXA scan as the chance of finding osteoporosis (low BMD) is high in this group
- **Medium-risk (0-20)** → consider DXA scan if any other risk factor(s) (Table 1) for osteoporosis is present
- **Low-risk (<0)** → consider deferring DXA

**In patients initially deemed low risk, reassess risk if** there has been significant weight loss or any clinical risk factor development since the last visit, or if last assessment was five or more years ago.

Figure 1. OSTA for risk assessment in post-menopausal women



## Assessing fracture risk using the Fracture Risk Assessment Tool FRAX<sup>®</sup>

FRAX<sup>®</sup> calculates one's fracture risk (FRAX score can be calculated at [sheffield.ac.uk/FRAX](http://sheffield.ac.uk/FRAX)). It determines the 10-year probability of having a fracture using age, body mass index, and other risk factors.<sup>8</sup> FRAX<sup>®</sup> helps better understand the patient's fracture risk to aid decision for further assessment (see 'When to start treatment' section for more information on FRAX<sup>®</sup>).

**Give lifestyle advice to all patients at risk of osteoporosis or fractures (especially to post-menopausal women, and men 65 years and older).**

<sup>a</sup> Possible osteoporosis risk should be explored in men younger than 65 years if they have significant risk factors such as use of steroids or anti-androgens, or medical conditions associated with bone loss such as hypogonadism or hyperthyroidism.



## Lifestyle advice for all patients at risk

Healthy lifestyle choices can reduce osteoporosis-associated risks. However, when pharmacological treatment is indicated, lifestyle management is not considered a substitute.

- Advise on appropriate calcium intake (1,000 mg/day of elemental calcium for healthy adults 51 years and older, and 800 mg/day for adults 19 to 50 years old\*)
- Optimise vitamin D intake (51 to 70 years old = 600 IU/day; >70 years old = 800 IU/day<sup>^</sup>)
- Advise on appropriate weight-bearing, muscle-strengthening, and balance exercises such as walking, elastic band exercises, and Tai Chi
- Advise on smoking cessation and appropriate alcohol intake
- Educate on fall risk, home safety, and footwear
- Educate patient about osteoporosis and fragility fractures and their implications

\* Source: Singapore Health Promotion Board

<sup>^</sup> Source: Institute Of Medicine

## Making a diagnosis

The diagnosis of osteoporosis is universally defined by either the presence of a fragility fracture, or a hip and/or spine DXA BMD T-score of -2.5 or lower.<sup>5,6,7</sup> DXA is the standard technique for measuring BMD. BMD measurements of the hip and spine are widely accepted for the diagnosis. Consider adding vertebral fracture assessment (VFA) or a thoracolumbar (TL)

X-ray to identify vertebral fractures in older adults with height loss or lower back pain.

After diagnosis, a careful clinical history and physical examination is required, and the laboratory tests below should be considered to exclude secondary contributors of bone loss (Table 2).

Table 2. Laboratory tests to identify secondary contributors of osteoporosis

	Test	Clinical rationale
<b>More commonly indicated</b>	Creatinine	Determines baseline renal function to inform treatment choice (may also indicate presence of chronic kidney disease-mineral and bone disorder [CKD-MBD])
	Full blood count	Identifies a range of disorders, including presence of malignancies and malabsorption
	Corrected calcium	Increased level might indicate primary hyperparathyroidism or malignancy; decreased level might indicate malabsorption or vitamin D deficiency
	25-hydroxy vitamin D <sup>^</sup>	To test baseline level for vitamin D (aim for >20 ng/mL for optimal bone and muscle strength)
<b>Others</b>	Thyroid-stimulating hormone	Decreased levels might indicate hyperthyroidism or over-replacement with thyroxine
	Erythrocyte sedimentation rate (ESR)	Very high ESR might indicate rheumatological disease. A raised ESR in association with raised creatinine and anaemia might indicate haematological disease such as myeloma
	Alkaline phosphatase	Increased levels might indicate liver disease, Paget's disease, recent fracture, or other bone pathology
	Serum phosphate*	Abnormal levels might indicate vitamin D deficiency or renal phosphate wasting
	Spot urine calcium/creatinine ratio	Elevated levels might indicate idiopathic hypercalciuria <sup>†</sup>
	Serum total testosterone <sup>#</sup>	Decreased levels might indicate hypogonadism

Other disease states that can act as secondary contributors: Cushing's syndrome, chronic obstructive pulmonary disease, organ transplantation, and anorexia nervosa

<sup>^</sup> Repeated tests are not needed

\* Fasting needed for more accurate results

<sup>†</sup> Urinary calcium/creatinine level >0.6 (urine calcium and urine creatinine in mmol/l) suggests the need to do 24-hour urine calcium test

<sup>#</sup> In men <70 years of age or in those with hypogonadal symptoms. Morning test recommended for more accurate results

## Referring patients

**Consider referring only selected patient groups to a specialist.** These include:

- Creatinine clearance estimated by Cockcroft-Gault equation  $<30$  mL/minute
- Confirmed or strongly suspected *complex* secondary causes
- Patients with multiple fragility fractures **AND** very low DXA BMD (T-score  $<-3.0$ )
- Patients who adhere to treatment and experience fragility fractures or continued bone loss ( $>4-5\%$  deterioration in DXA BMD<sup>b</sup>) after at least a year of treatment. Before referring these patients, consider reviewing secondary contributors of osteoporosis and/or switch to intravenous or subcutaneous therapy to negate problems of poor gut absorption or poor compliance with oral therapy

The choice of specialist depends on the reason for referral.

## When to start treatment

Treatment decision-making involves exercising clinical judgement in weighing overall risks and benefits of different management options in individual patient circumstances, and discussing with the patient (including treatment duration). Consider starting anti-osteoporosis treatment in the following groups:

- Patients presenting with a fragility fracture<sup>5,6,7</sup>
- Patients without a fragility fracture, but with DXA BMD T-scores of  $\leq -2.5$ <sup>5,6,7</sup>
- Osteopaenic patients (DXA BMD T-scores  $>-2.5$  but  $<-1$ ) without a fragility fracture, but with high fracture risk

## Assessing fracture risk using FRAX<sup>®</sup>

FRAX<sup>®</sup> is a useful tool to determine absolute fracture risk and assist in treatment decisions ([sheffield.ac.uk/FRAX](http://sheffield.ac.uk/FRAX)). **The 10-year probability of developing a fracture estimated by FRAX<sup>®</sup> should be interpreted in light of individual patient circumstances**, as the parameters used by FRAX<sup>®</sup> in the calculation are not exhaustive. Although other fracture risk calculators are available (such as Garvan fracture risk calculator or QFracture), FRAX<sup>®</sup> is recommended given its multi-country validation and the availability of a Singapore model. FRAX<sup>®</sup> thresholds for treatment should be country-specific.<sup>8</sup> **Singapore-specific thresholds are under development and will be made available at [ace-hta.gov.sg](http://ace-hta.gov.sg) once validated.**

Scan to go  
to FRAX<sup>®</sup>  
calculator  
website



## Fragility fracture

A fracture (such as that of the vertebra, hip, femur, pelvis, humerus, or wrist) that occurs as a result of minimal trauma (such as a fall from standing height or less) or no identifiable trauma. Metatarsal, metacarpal, and phalangeal fractures are not considered osteoporotic or fragility fractures.

Asymptomatic vertebral fractures can be visually identified as  $\geq 20\%$  decrease in vertebral height (anterior, mid, or posterior dimensions). These are common fragility fractures and should be correctly recognised.



## Treatment monitoring

Consider DXA BMD at baseline, after one to two years of treatment (to establish clinical effectiveness), and every two to three years thereafter. Assess for significant DXA BMD deterioration of  $>4-5\%$  compared to previous measurement and for any fracture occurring while on medication (including asymptomatic vertebral fractures).

<sup>b</sup> Or more than the least significant change (LSC) at the particular centre (DXA centres are encouraged to calculate their own precision errors and LSCs according to the International Society of Clinical Densitometry [ISCD] standards). For the purpose of monitoring, DXA scans should ideally be repeated at the same centre.

# Identification and management of osteoporosis in primary care



Post-menopausal women, and men 65 years and older

Assess patient's risk profile by checking clinical risk factors for osteoporosis and fractures for both men and women:

- Family history of osteoporosis or fragility fractures
- Previous fragility fracture
- Ageing
- Low body weight
- Height loss (>2 cm within three years)
- Early menopause (45 years and younger)
- Presence of diseases that can lower bone density or increase fracture risk
- Certain medications
- Low calcium intake (<500 mg/day)
- Excessive alcohol intake (>2 units/day)
- Smoking (any)
- Prolonged immobility
- History of falls

▶ In post-menopausal women, OSTA<sup>#</sup> can support detecting a woman's osteoporosis risk

▶ FRAX<sup>®</sup> helps to better understand the patient's fracture risk to aid decision for further assessment.

## Osteoporosis/fragility fracture unlikely

**Give lifestyle advice**, and reassess risk if there has been significant weight loss or any clinical risk factor development since the last visit, or if last assessment was five or more years ago

**Address risk factors, give lifestyle advice and monitor BMD** based on patient's risk profile<sup>^</sup>



Patients presenting with fragility fractures of the hip or other major bone sites\*



### Send patient for DXA scan

Consider adding Vertebral Fracture Assessment (VFA) or a thoracolumbar (TL) X-ray to identify vertebral fractures in older adults with height loss or lower back pain.

T-score  $\geq -1$

T-score  $> -2.5$  to  $< -1$

T-score  $\leq -2.5$

FRAX<sup>®</sup> is a useful tool to determine absolute fracture risk and assist in treatment decisions. The 10-year probability of developing a fracture estimated by FRAX<sup>®</sup> should be interpreted in light of individual patient circumstances, as factors used by FRAX<sup>®</sup> in the calculation are not exhaustive.

No Treatment

Treatment

### Make osteoporosis diagnosis

Check for secondary contributors and treat accordingly

**START TREATMENT<sup>†</sup> and encourage healthy lifestyle**  
See supplementary guide for information about treatment options and monitoring

### Refer to a specialist if:

- Creatinine clearance  $< 30$  mL/minute
- A complex secondary cause is present or strongly suspected
- Patients with multiple fragility fractures **AND** very low DXA BMD (T-score  $< -3.0$ )
- Patients who adhere to treatment and who experience multiple fragility fractures or continued bone loss ( $> 4-5\%$  deterioration in DXA BMD) after at least a year of treatment

\* Although not absolutely needed for diagnosis and initiating treatment, a DXA scan assessment is useful for monitoring BMD improvement and therapy response.

<sup>#</sup> Osteoporosis Self-Assessment Tool for Asians.

<sup>^</sup> Evidence suggests that BMD can be measured after 10 years in patients with normal DXA BMD and after two years in those with DXA BMD T-score between  $-2.00$  to  $-2.49$ .

<sup>†</sup> Treatment decision-making involves exercising clinical judgement in weighing overall risks and benefits of different management options in individual patient circumstances, and discussing with the patient (including treatment duration).

## References

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## About the Agency

The Agency for Care Effectiveness (ACE) is the national health technology assessment agency in Singapore residing within the Ministry of Health (MOH). ACE develops evidence-based “Appropriate Care Guides” or ACGs to guide a specific area of clinical practice. ACGs are aimed at complementing MOH Clinical Practice Guidelines when these are available, by providing additions and updates as reflected in the evidence at the time of development, and incorporating cost-effectiveness considerations where relevant. The ACGs are not exhaustive of the subject matter. When using the ACGs, the responsibility for making decisions appropriate to the circumstances of the individual patient remains with the healthcare professional. This ACG will be reviewed 3 years after publication, or earlier, if new evidence emerges that requires substantive changes to the recommendations.

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