



Bone density testing in general practice

A guide to Dual Energy X-ray Absorptiometry (DXA)

Scanning of the axial skeleton by dual energy X-ray absorptiometry (DXA) is the gold standard in Australia for the measurement of bone mineral density (BMD). DXA is a diagnostic tool for osteoporosis or osteopenia, enabling doctors to determine the extent of bone loss for clinical decision making. Who to refer for DXA, how to interpret a bone densitometry report, and how to apply the results to guide osteoporosis management are outlined in this guide.

Poor bone health is common in Australia

An estimated 4.7 million Australians over the age of 50 currently have osteoporosis or osteopenia, with over 144,000 associated fractures (2013). Without major improvements in diagnosis and management, the rate of osteoporotic fracture will be around 30% higher by 2022, costing an estimated \$33.6 billion over the next decade.

In general practice, early detection can prevent a first fracture. For patients who have already fractured, investigation and initiation of osteoporosis medication is crucial to reduce the very high risk of subsequent fractures.



Who to send for a DXA scan

Patients over 50 with risk factors

| Patients over 50 with risk factors | MBS item |
|--|-----------|
| Family history – parent or sibling | No rebate |
| Early menopause | 12312 |
| Hypogonadism | 12312 |
| ≥ 3 months glucocorticoids (at Prednisone ≥ 7.5mg) | 12312 |
| Coeliac disease/malabsorption disorders | 12315 |
| Rheumatoid arthritis | 12315 |
| Primary hyperparathyroidism | 12315 |
| Hyperthyroidism | 12315 |
| Chronic kidney or liver disease | 12315 |
| Androgen deprivation therapy | 12312 |
| Recurrent falls | No rebate |
| Breast cancer on aromatase inhibitors | No rebate |
| Treatment with antiepileptic medications | No rebate |
| Low body weight | No rebate |
| HIV and its treatment | No rebate |
| Major depression/ SSRI treatment | No rebate |
| Type 1 and type 2 diabetes mellitus | No rebate |
| Multiple myeloma/monoclonal gammopathy | No rebate |
| Organ or bone marrow transplant (item 12312 applies if treated with glucocorticoids or if kidney disease present) | No rebate |

Patients with a minimal trauma fracture

| Patients with a minimal trauma fracture | MBS item |
|---|----------|
| A minimal trauma fracture in a patient over 50 indicates probable osteoporosis. DXA is recommended to confirm low bone density and to establish a baseline BMD for treatment. | 12306 |

Suspected vertebral fracture

| Suspected vertebral fracture | MBS item |
|---|----------|
| Refer for spinal X-ray when: – Height loss of 3cm or more – Thoracic kyphosis – New onset back pain suggestive of fracture | 12306 |

If fracture confirmed, refer for DXA

Vertebral fracture assessment (VFA) is offered with some DXA scans. VFA may be a useful screen for fractures in people with height loss. MBS rebate not available for VFA.

Patients over 70 years of age

| Patients over 70 years of age | MBS item |
|---|----------|
| For men and women over 70 years, MBS rebate applies regardless of other risk factors. | 12323 |

The DXA report

The level of detail provided in a DXA report varies. To comply with guidelines, all reports should state the make and model of the DXA machine used, BMD (measured in g/cm²), T-score and Z-score.



Medical Imaging Centre – Bone Densitometry Report

Dear Doctor

Re: [Patient]

DOB:

This patient attended on for bone densitometry of AP spine and left hip.

Bone mineral density was measured by [DXA machine make and model]. The results are summarised below:

Scan date: **Sex: Female**
Age at scan: years **Ethnicity:**

T-score compares the patient's BMD with that of young healthy adults of the same sex.

L1–L4 or L2–L4 usually measured.

| Scan site | Region | BMD | T-score | Z-score |
|------------|--------|-------|---------|---------|
| AP spine | L2-L4 | 0.890 | -2.6 | -1.1 |
| Left femur | Total | 0.822 | -1.5 | -0.4 |
| | Neck | 0.831 | -1.5 | -0.0 |

Total proximal femur combines femoral neck, shaft and trochanter.

Z-score compares the patient's BMD with that of adults of the same age and sex.

Results

Lumbar spine: This patient has a BMD T-score of 2.6 SD below the mean for young females at this site. BMD is considerably reduced.

Left femur: This patient has a BMD measurement of 1.5 SD below the mean for young females at this site. BMD is mildly reduced.

Vertebral fracture assessment: VFA demonstrates a deformity of L3, indicating a probable vertebral fracture. Confirmation with X-ray is recommended.

VFA (vertebral fracture assessment) is offered by some imaging centres. It is a useful screening tool for asymptomatic vertebral fracture. Fractures detected by VFA should be confirmed by plain x-ray. VFA does not attract an MBS rebate.

T-score

The T-score compares the patient's bone density to the peak bone density of young adults. It is the number of standard deviations (SDs) of the BMD measurement above or below that of young healthy adults of the same sex. According to definitions agreed by the World Health Organisation, a T-score of -2.5 or lower at the spine or hip is indicative of osteoporosis.

| | | |
|----------------------------|-------------------------------|--|
| Normal bone density | T-score -1.0 or above | BMD not more than 1.0 SD below young adult mean |
| Osteopenia | T-score between -1.0 and -2.5 | BMD between 1.0 and 2.5 SDs below young adult mean |
| Osteoporosis | T-score -2.5 or below | BMD 2.5 or more SDs below young adult mean |

Z-score

The Z-score compares the patient's bone density to that of adults of the same age. It is the number of SDs of the BMD measurement above or below that of adults of the same age and sex. Z-score is a useful indicator of possible secondary osteoporosis. A Z-score of -2.0 or below should trigger investigations for underlying disease to exclude other causes of bone mineral loss.

Using the DXA report to assist treatment and management decisions

The T-score is the primary tool for the diagnosis of osteoporosis or osteopenia in patients who have not sustained a minimal trauma fracture (MTF).

MTF in a post-menopausal woman or man over 50 indicates that osteoporosis is probably present, regardless of the T-score. MTFs most commonly occur in people with T-scores in the osteopenic range (-1.0 to -2.5). In these patients, the T-score can be used to confirm low bone density and to establish a baseline BMD for treatment.

| T-score | Minimal trauma fracture | Risk factors | Recommendation |
|--------------|-------------------------|---|--|
| ≤ -2.5 | Yes | One or more | Initiate treatment with osteoporosis medication immediately. Adequate calcium, vitamin D and weight-bearing exercise are important. Investigate secondary causes of bone loss. Review falls risk in elderly. Repeat DXA in ≥ 2 years. |
| -1.0 to -2.5 | Yes | One or more | Initiate treatment in most cases. In younger patients (< 55), or where T-score is normal or mildly osteopenic (-1.0 to -1.5), treatment may be reconsidered. Adequate calcium, vitamin D and weight-bearing exercise are important. Investigate secondary causes of bone loss. Review falls risk in elderly. Repeat DXA in ≥ 2 years. |
| ≤ -2.5 | No | One or more | Treatment recommended. Treatment may not be necessary in women under 55 and men under 60, or if modifiable risk factors only (lower absolute fracture risk). Adequate calcium, vitamin D and weight-bearing exercise are important. Investigate secondary causes of bone loss. Review falls risk in elderly. Repeat DXA in ≥ 2 years. |
| -1.0 to -2.5 | No | One or more | Treatment not necessary in most cases. Consider treatment for post-menopausal women and men over 65 if T-score is in the lower part of the osteopenic range (-2.0 to -2.5). Adequate calcium, vitamin D and weight-bearing exercise are important. Investigate secondary causes of bone loss. Review falls risk in elderly. Repeat DXA in 2-5 years, depending on severity of bone loss. |
| ≤ -1.5* | No | Commencing glucocorticoids 7.5mg/day prednisolone or equivalent for at least 3 months | Preventative treatment with osteoporosis medication for the duration of glucocorticoid therapy. *T-score ≤ -1.0 applies under RPB (Repatriation Pharmaceutical Benefits Scheme for veterans). |

Instances where reporting and interpretation of DXA results may be more complex

- Osteoarthritis of the lumbar spine can lead to adjacent bony sclerosis, which may result in falsely high BMD readings. Proximal femur BMD is often more reliable in such patients.
- Vascular or soft tissue calcification, previous fracture and extremes of body weight are less common causes of errors in BMD estimation.
- Use of strontium ranelate. About 50% of the increase in spinal BMD in patients treated with strontium ranelate is related to incorporation of strontium into bone, and is not a true increase in bone mass.

Patient case studies

Presentation: Female aged 60. Low body weight, poor diet. Mother fractured hip following a fall.

Action: Refer for DXA of total hip and spine.

DXA result: T-score -2.8 (hip), -2.2 (spine). Z-score -0.8.

Recommendation: Treat with osteoporosis medication. Advise patient on lifestyle modifications and assess diet, paying particular attention to calcium and vitamin D sufficiency and exercise. Repeat DXA in ≥ 2 years.



Presentation: Male aged 65. Sudden onset back pain after heavy lifting. Heavy drinker. Height loss 3cm.

Action: Refer for spine X-ray. If X-ray confirms fracture, refer for DXA of hip and spine.

DXA result: Fracture of L1, confirmed by X-ray. T-score -2.6 (spine), -1.8 (hip). Z-score -2.3.

Recommendation: Treat with osteoporosis medication. Advise patient on lifestyle modifications and assess diet, paying particular attention to calcium and vitamin D sufficiency and exercise. Low Z-score should trigger investigations for secondary osteoporosis. Repeat DXA in ≥ 2 years.



Presentation: Female aged 59. Recent Colles' fracture after trip and fall at home, treated at local hospital.

Action: Refer for DXA of total hip and spine.

DXA result: T-score -2.0 (hip), -1.8 (spine). Z-score not reported.

Recommendation: Treat with osteoporosis medication. Assess diet and lifestyle, paying particular attention to calcium and vitamin D sufficiency and exercise. Repeat DXA in ≥ 2 years.



Presentation: Male aged 72. No other risk factors for osteoporosis.

Action: Refer for DXA of total hip and spine

DXA result: T-score -1.4 (hip), -1.6 (spine). Z-score -0.4.

Recommendation: Treatment not necessary. Assess diet and lifestyle, paying particular attention to calcium and vitamin D sufficiency and exercise. Assess falls risk. Repeat DXA in 2-5 years.



Presentation: Female aged 53. Minimal trauma fracture of ankle. No obvious risk factors.

Action: Refer for DXA of hip and spine.

DXA result: T-score -1.4 (hip), -0.8 (spine). Z-score not reported.

Recommendation: Consider the need to treat against overall risk of fracture. Assess diet and lifestyle, paying particular attention to calcium and vitamin D sufficiency and exercise. Repeat DXA in ≥ 2 years.



All case studies provided for illustrative purposes only, people depicted are models

www.osteoporosis.org.au

National toll-free number for patients 1800 242 141

This guide for General Practice is proudly supported by **HOLOGIC**[®]

Extraordinarily powerful care

Copyright © Osteoporosis Australia 2014

oa
osteoporosis australia