

Appendix 6 on Osteoporosis

Diagnosis of Osteoporosis

A “gold standard” for diagnosis should be based on a particular site and technology. Measurements of T-scores at the hip are the best predictors of hip fractures.

Although not part of the WHO classification, the presence of a fragility fracture may also be considered diagnostic for osteoporosis provided other causes of non-osteoporotic fractures have been excluded i.e. pathologic fracture. The following guidelines describe the skeletal sites to measure under specified circumstances and are taken from the International Society of Clinical Densitometry guidelines

Skeletal sites to measure:

- Measure BMD at both the PA spine and hip in all patients.
- Forearm BMD should be measured under the following circumstances:
 - Hip and/or spine cannot be measured or interpreted.
 - Hyperparathyroidism.
 - Very obese patients (over the weight limit for DXA table).

Spine Region of Interest:

- Use PA L1-L4 for spine BMD measurement.
- Use all evaluable vertebrae and only exclude vertebrae that are affected by local structural change or artifact. Use three vertebrae if four cannot be used and two if three cannot be used.
- BMD based diagnostic classification should not be made using a single vertebra only one evaluable vertebra remains after excluding other vertebrae, diagnosis should be based on a different valid skeletal site.
- Anatomically abnormal vertebrae may be excluded from analysis if:
 - They are clearly abnormal and non-assessable within the resolution of the system; or

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- There is more than a 1.0 T-score difference between the vertebra in question and adjacent vertebrae.
- When vertebrae are excluded, the BMD of the remaining vertebrae is used to derive the T-score.
- Lateral spine should not be used for diagnosis, but may have a role in monitoring.

Hip Region of Interest:

- Use femoral neck or total proximal femur, whichever is lowest.
- BMD may be measured at either hip.
- There are insufficient data to determine whether mean T-scores for bilateral hip BMD can be used for diagnosis
- The mean hip BMD can be used for monitoring, with total hip being preferred. *Forearm Region of Interest*
- Use 33% radius (sometimes called one-third radius) of the non-dominant forearm for diagnosis. Other forearm regions of interest are not recommended.

Treatment of Osteoporosis

The primary goals for pharmacologic and non-pharmacologic osteoporosis interventions are to:

- Prevent / reduce fractures;
- Stabilize or achieve an increase in bone mass;
- Relieve symptoms of fractures and skeletal deformity;
- Maximize physical function (for example, halt progressive deformity).

The ability to achieve these goals depends on the patient's and the physician's commitment to therapy and the potential for the chosen therapy to yield results. In general, the first choice therapeutic option should be a treatment that is effective in reducing both vertebral and non-vertebral fractures.

Pharmacological Interventions

The decision to provide pharmacologic interventions for osteoporosis should be taken based on the history of fragility, fractures, bone mineral density result, age and the presence or absence of age independent risk factors such as glucocorticoid therapy.

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Pharmacologic treatments such as bisphosphonates, strontium ranelate, the monoclonal RANKL-antagonist (denosumab) and selective estrogen receptor modulators (SERMs) are all suitable for initiation in primary care.

Loss can only be determined by two measurements; the decision can be based on the measured bone density (and the other listed factors)

Anti-Resorptives

A bisphosphonate (alendronate, risedronate, ibandronate or zoledronate) can be used as a first-line treatment for osteoporosis. Bisphosphonates should not be given to people who

- Are unable to adhere to the dosing instructions;
- Hypocalcaemia;
- Severe renal impairment (eGFR<30ml/min);

RANKL-antagonist (Denosumab)

RANK Ligand Inhibitor

Denosumab, a RANK ligand inhibitor, is a very potent antiresorptive inhibitor. It has anti fracture efficacy against vertebral fractures, non-vertebral fractures and hip fractures. It is administered by sub-cutaneous injection every 6 months. It may be prescribed in the community. It is appropriate for patients intolerant of or non-compliant with oral bisphosphonates.

Available in a primary care setting as a 6 monthly, sub-cutaneous injection, this is a monoclonal antibody which targets RANK ligand, a protein that acts as the primary mediator of osteoclast activity. Following the demonstration of a 68% reduction in new vertebral fractures over 3 years, Denosumab has been approved for treatment of post-menopausal osteoporosis. In particular, Denosumab is a useful alternative in patients intolerant of or non-compliant with bisphosphonates.

Strontium Ranelate

Strontium ranelate is a suitable alternative to bisphosphonates. It has antifracture efficacy against vertebral fracture, non-vertebral fracture and hip fractures. It should be considered if a bisphosphonate cannot be taken.

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Selective Estrogen Receptor Modules (SERMS)

Raloxifene and Bazedoxifene prevent bone loss in the lumbar spine and proximal femur, but fracture risk reduction has only been demonstrated at the spine. Raloxifene should be considered a second line treatment if a bisphosphonate is inappropriate or not tolerated. Basedoxifene has recently been launched with evidence of fracture risk reduction at the spine and non vertebral sites. SERMS Both may increase the risk of thrombo-embolus threefold.

Contraindications:

- Hx of DVT/PE;
- Premenopausal women;
- Women experiencing hot flushes.

Hormone Replacement Therapy

Recent studies have raised concerns about the safety of hormone replacement therapies (HRT) in the prevention of osteoporosis. If used only for the prevention of post-menopausal osteoporosis, the risks of using HRT long term may outweigh the benefits and it is not recommended as a first line therapy for the prevention or treatment of osteoporosis. Short term use of HRT for relief of menopausal symptoms is beneficial to bone.

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Anti-Fracture Efficacy of common pharmacological interventions for Osteoporosis.

<u>Intervention</u>	<u>Vertebral</u>	<u>Non Vertebral</u>	<u>Hip</u>
Alendronate	☑	☑	☑
Risedronate	☑	☑	☑
Etidronate	☑	-	-
Ibandronate	☑ High risk subgroups	-	-
Pretact	☑	-	-
Raloxifene	☑	-	-
Teriparatide	☑	☑	☑
Strontium Ranelate	☑	☑	☑
Denosumab	☑	☑	☑
Zoledronate	☑	☑	☑
Basedoxifene	☑	☑	☑

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Anabolic Treatments

Parathyroid hormone therapy, Teriparatide (and PTH(1-84) stimulate bone formation and are given daily by subcutaneous injection for a period of -24 months and are the most potent anabolic bone agent currently available. It should be reserved for patients with a history of vertebral fracture and low spinal BMD on DXA. Depending on local arrangements, this treatment is usually initiated on the recommendation of a specialist. There is evidence that PTH therapy reduces vertebral and non-vertebral fractures.

Adjunctive Therapy

Calcium and/or Vitamin D supplementation should be given to all patients who receive treatment for osteoporosis (Calcium and Vitamin D supplements are not sufficient therapy on their own for patients who have already had an osteoporotic fracture)

Non-Pharmacologic Interventions

Physical Activity / Exercise

Advice regarding exercise should be tailored to the individual's needs and capabilities. Some people may benefit from referral to an exercise programme. Balance and gait training for people at risk of falls should be provided. Moderate levels of activity, including walking, have been found to be associated with a substantially lower risk of hip fracture in postmenopausal women.

Physiotherapy and Occupational Therapy Management

Physiotherapy is an essential component in the total management of osteoporosis and low BMD through individual prescriptive exercise programmes, specific techniques and activities with ongoing education. Appropriate treatment goals should be established following a thorough Physiotherapy Assessment related to the persons DXA results, risk factors for falls, and their overall health and functional status. The programme should be dynamic, fully therapeutic, developed, reviewed and modified by the Chartered Physiotherapist as required. Please refer to appendices 5 (a) and 5 (b).

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Occupational Therapy Management

The Occupational Therapist plays a key role in the overall management of patients with osteoporosis due to their expertise on areas of occupational performance. The Occupational Therapist should assess the areas of cognition, perception and the home environment. They should also work with people on their mobility and transfer skills, and contribute to the overall physical evaluation of the patient assessing areas of upper and lower limb movements, speed, dexterity, co-ordination and rhythm. The input of the occupational therapist should determine the level of physical assistance a patient will require in order to carry out activities of daily living.

Serial BMD Measurements

If repeat DXA scanning is thought to be appropriate, it should only be carried after the person has been taking treatment for at least 2 years because the beneficial effect on the BMD occurs over many months. More frequent scanning (yearly) may be indicated in patients on high-dose corticosteroid therapy

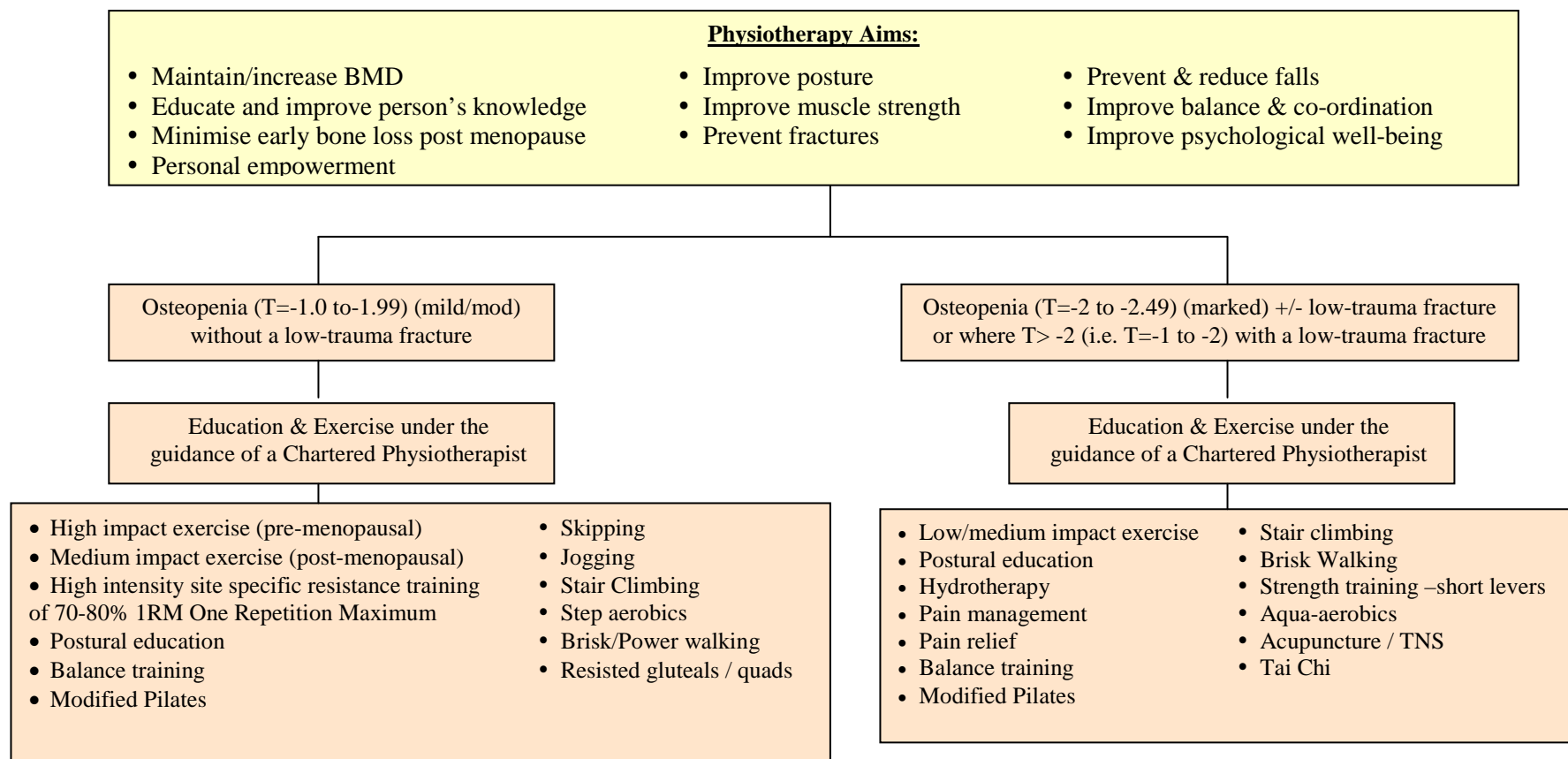
Repeat DXA scanning should be considered if a woman has another fragility fracture despite adhering fully to treatment with a bisphosphonate for one year. NICE recommends that if the BMD is found to be below the pre-treatment level, an alternative treatment should be considered.

Biochemical Markers

Biochemical markers have the potential to have a major clinical impact on the investigation and management of osteoporosis. Biochemical markers alter with therapy and these changes may be used to predict subsequent changes in BMD. Biochemical markers can also be a sensitive index of treatment compliance as responses to therapy occur within 3 months of starting treatments.

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Appendix 6 (a) Physiotherapy Management - Osteopenia



Appendix 6 (b)

Physiotherapy Management - Osteoporosis

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