وزارة الصحـــــــة
Ministry of Health

# Guidelines on the Screening, Diagnosis, and Treatment of Osteoporosis

**1ST Edition**

**2023**

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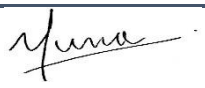
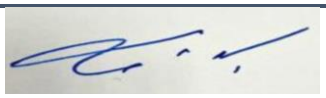
| **Signature** |  | **Signature** |  |
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# Contents

## 1. Acronyms

| | |
|---|---|
| **ALP** | Alkaline phosphatase |
| **BMD** | Bone Mineral Density |
| **BMI** | Body mass index |
| **BP** | Blood pressure |
| **BW/day** | Body weight per day |
| **CBC** | Complete blood count |
| **CKD** | Chronic kidney disease |
| **cm** | Centimeter |
| **COPD** | Chronic obstructive pulmonary disease |
| **CRP** | C-reactive protein |
| **DEXA** | Dual-energy X-ray absorptiometry scan |
| **DGSMC** | Directorate General of Specialized Medical Care |
| **ESR** | Erythrocyte sedimentation rate |
| **ESRD** | End-stage renal disease |
| **FAMCO** | Family And Community Medicine Clinic. |
| **FRAX** | The Fracture Risk Assessment Tool |
| **GCs** | Glucocorticoid |
| **GFR** | Glomerular filtration rate |
| **GP** | General physician |
| **HRT** | Hormone replacement therapy |
| **HT** | Hormone therapy |
| **IU** | International unit |
| **IV** | Intravenous |
| **LFT** | Liver function tests |
| **mcg** | Micrograms |
| **MOF** | Major osteoporotic fracture |
| **MOH** | Ministry of Health |

| | |
|---|---|
| **PCP** | Primary care physician |
| **PTH** | Parathyroid hormone |
| **RA** | Rheumatoid arthritis |
| **RFT** | Renal function test |
| **SC** | Subcutaneous injection |
| **TFT** | Thyroid Function Test |
| **VFA** | Vertebral fracture assessment |
| **WHI** | Women Health Initiative |
| **WHO** | World Health Organization |

## 3. Definitions

**3.1. Fracture risk assessment (FRAX):** A tool for estimating the risk of developing a hip fracture or other major fracture in the next 10 years, especially if it is osteoporosis. It is used for ages 40 to 90, either with or without BMD values , as indicated.

**3.2. Fragility fracture:** A fracture resulting from a fall from standing height or less. These fractures, which most commonly occur at the hip, spine, or wrist, indicate that an underlying illness has weakened the body's bones.

**3.3. Menopausal transition stage:** Includes 2 to 3 years pre- and post-menopause. It is often between 45 and 55 years of age.

**3.4. Menopause:** Is a point in time twelve months after a woman's final menstrual period. It is a retrospective diagnosis.

**3.5. Osteopenia**: A condition in which there is a decrease in bone density, but less severe than in osteoporosis (T-score of -1 to **–** 2.5).

**3.6. Osteoporosis:** is a disease that is characterized by low bone mass, deterioration of bone tissue, and disruption of bone microarchitecture: it can lead to compromised bone strength and an increase in the risk of fractures.

# CHAPTER ONE

## 4. Introduction

Osteoporosis is a skeletal disorder described as a decline in bone density, leading to a reduction in mechanical strength of the bone and therefore increased propensity to fracture. The most common forms of osteoporosis seen in clinical practice are postmenopausal and age-related. Osteoporosis represents a major risk to healthy aging as it is associated with an increased risk of fractures, particularly spine and hip fractures. Consequently, it represents a main risk to senior citizens' mobility and general health. In Oman and with the increase in the elderly population, osteoporosis cases and related complications has increased. Therefore, special attention has to be given to this issue.

This guideline will provide a reference on the management of osteoporosis in MoH institutions, including the best practices for screening, diagnosis, and treatment of osteoporosis.

## 5. Purpose

**5.1.** Establish standard procedures for assessing, diagnosing, and treating osteoporosis, including strategies to prevent fragility fractures in postmenopausal women (≥ 50 years) and men ≥ 60.

**5.2.** Improve all facets of the osteoporosis screening pathway and guide more consistent referrals.

**5.3.** Ensure the population receives safe and high-quality care, as well as timely referrals for diagnosis and/or treatment of osteoporosis.

## 6. Scope

These guidelines apply to all MoH healthcare professionals and institutions that participate in providing services related to the management of osteoporosis.

# CHAPTER TWO

## 7. Procedure

### 7.1. Indications for screening and treatment accordingly:

**7.1.1.** Postmenopausal women age **≥** 50 years and men **≥** 60 years.

**7.1.2.** Early menopause (i.e., less than 45 years of age).

**7.1.3.** Patient on long-term use of glucocorticosteroids (**>**3 months) more than 7.5 mg of prednisolone or equivalent. **(Appendix.1)**.

**7.1.4.** Presence of an underlying disease that causes secondary osteoporosis **(Appendix.2).**

### 7.2. Screening and diagnosis for Osteoporosis (to be started at the primary care):

**7.2.1. Diagnosis:**

**7.2.1.1.** History and physical examination.

**7.2.1.2.** Screening with the FRAX Tool Test, which accepts ages 40 to 90 by using any GCC population using the online link: https://frax.shef.ac.uk/frax/

**7.2.1.3.** If FRAX 10-year risk scores (result):

| FRAX result | Fracture risk | DEXA scan |
|---|---|---|
| **<** 20% MOF or **<** 3 % HIP | Low risk | Not required |
| **≥** 20% MOF or **≥** 3 % HIP | High risk | Required |
| *** MOF: Major Osteoporotic Fracture.** | | |

**Table 1: FRAX 10-year risk scores**

**7.2.1.4. Indication of DEXA scan:**

**7.2.1.4.1.** FRAX: **≥** 20% MOF or/and **≥** 3 % HIP.

**7.2.1.4.2.** Age: Female or male age 65 and older.

**7.2.1.4.3.** Adults with a fragility fracture "a fracture caused by an injury that would be insufficient to fracture a normal bone (Hip, vertebral and distal radius).

**7.2.1.4.4.** Anyone being treated for low bone density to monitor treatment effects.

**7.2.1.4.5.** Women discontinuing estrogen treatment (for early menopause) earlier than planned should be considered for bone density testing.

**7.2.1.5. Laboratory and radiology investigation (Confirmed osteoporotic patient):**

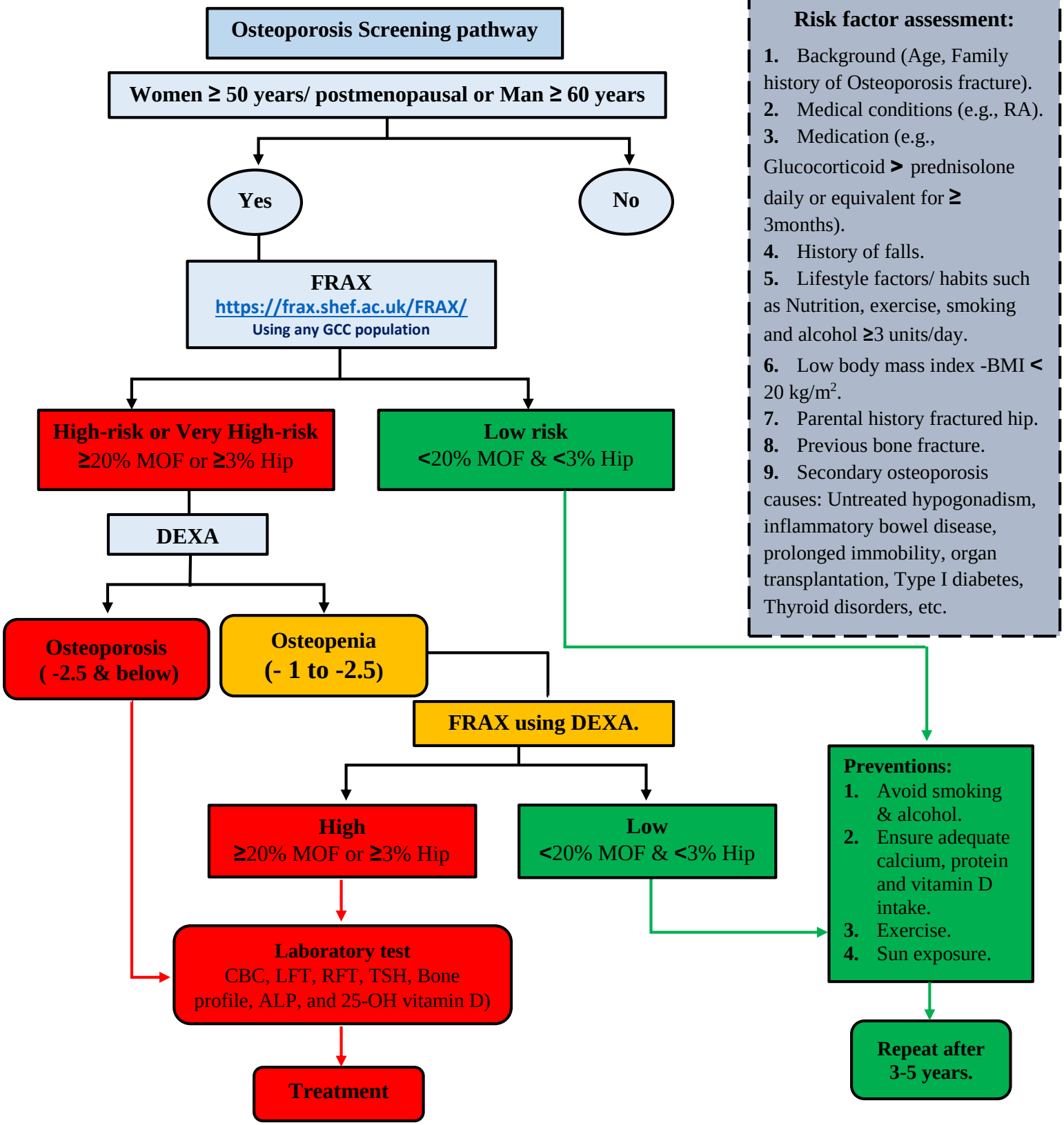
**7.2.1.5.1.** CBC, RFT, LFT, Bone profile, ALP, TFT, and 25 OH vitamin D

**7.2.1.5.2.** Other investigation, if indicated, for example:

a) Gonadal hormones (e.g., Testosterone level -in younger men with low bone density).
b) Celiac screen (gliadin antibodies or tissue-transglutaminase antibodies).
c) PTH if calcium is elevated.
d) Multiple Myeloma or malignancy screening if indicated.

**7.2.1.5.3.** Furthermore, when vertebral fractures are suspected, a spine x-ray is indicated.

### 7.2.2. Osteoporosis diagnostic and treatment algorithm:



### 7.2.3. Treatment:

#### 7.2.3.1. For all patients:

##### 7.2.3.1.1. Lifestyle changes:

**a)** Adequate sun exposure.

**b)** Eat a healthy diet (ensure adequate intake of Vitamin D, calcium, and Protein).

**c)** Exercise regularly.

d) Fall prevention, counselling and strategies.

**e)** Quit smoking and alcohol.

##### 7.2.3.1.2. Pharmacological:

**a)** Treat vitamin D deficiency to achieve serum total 25-OH vitamin D **>** 50 nmol/l, followed by maintaining a daily requirement of 600-800 u/day.

**b)** Maintain a calcium intake of 1000-1200 mg/day, preferably through diet; If not, then through supplements (consult a nutritionist if needed).

c) One –Alfa should only be used in chronic renal impairment and hypoparathyroidism cases.

### 7.2.3.2. Classify patient risk and initiate treatment as below:

| Risk category | Definition | 1st line | Alternative |
|---|---|---|---|
| **Low risk** | ❑ Age: postmenopausal<br>❑ No prior Fracture<br>❑ Osteopenia with FRAX probability **<** 20% MOF and **<** 3% hip | - Lifestyle as above (6.2.2.1.1).<br>- Pharmacological treatment for all osteoporosis **(See Table 3 & 4)**. | - |
| **High risk** | ❑ Postmenopausal with Prior Fragility Fracture or<br>❑ T-score **≤** −2.5 or<br>❑ T-score −1.0 to − 2.5 with FRAX probability of **≥** 20% MOF or **≥** 3% hip (after re-calculating FRAX with DEXA result) | **-** Lifestyle as above (6.2.2.1.1)<br>**-** Pharmacological treatment for all osteoporosis **(See Table 3 & 4)**<br>**-** Oral bisphosphonate (e.g., Alendronate) | **-** Zoledronic acid (Aclasta)<br>**-** Denosumab (Prolia) |
| **Very high risk** | ❑ Fracture within the past 12 months or<br>❑ Multiple Fractures or<br>❑ Fracture while on Osteoporosis drug treatment or<br>❑ Fracture while on medication harmful to bone or<br>❑ Very Low T-score **<**−3.0 or<br>❑ FRAX probability **>** 30% MOF, **>** 4.5 % hip | **Refer to Specialist.**<br>- Lifestyle as above<br>- Pharmacological treatment as for all osteoporosis **(See Table 3 & 4)**<br>Anabolic agents; Teriparatide. (**Refer to the expert)** | - Denosumab (Preferably)<br>- Zoledronic acid (alternative). |

**Table 2: Osteoporosis treatment**

#### 7.2.3.3. Medications used for all patients with osteopenia and osteoporosis:

| Medication | | Doses | Precaution | Contraindications |
|---|---|---|---|---|
| **Vitamin-D** | **Replacement for deficient patient** | - Cholecalciferol Vitamin D3- 50000 iu weekly (8weeks) followed by the supplement | - | - |
| | **Supplement** | - 800 - 1000 iu daily. | - | - |
| **Calcium supplement** | | - 1000-1200 mg/day (if diet inadequate). | - Take it on an empty stomach as divided doses. | - Renal stone<br>- Sarcoidosis |

**Table 3 : Medication used for all patient of osteopenia & osteoporosis.**

#### 7.2.3.4. Osteoporosis drugs:

| | Medication | Doses | Precaution | Contraindications |
|---|---|---|---|---|
| **Anti- resorptive drugs** | **Alendronate** | • 70 mg/week for 5 years (Oral).<br>• In high risk to continue for 10 years. | • Early morning, on empty stomach and to stay upright for at least 30 to 60 minutes. | • Active upper GI disorders.<br>• GI symptoms.<br>• Low GFR < 35 ml/min/1.73m$^2$.<br>• Sleeve gastrectomy. |
| | **Zoledronic Acid 5 mg injection** *Can be prescribed by Internists or Family Physicians or trained GPs. | • 5 mg/every 18 months (IV) for total of 3 doses (4.5 Years).<br>• In high risk to continue for 2 doses extra. | • Flu like symptoms, commonly with first dose of IV.<br>• Rare cases of jaw osteonecrosis (ONJ) has been reported. Hence, a dental work-up is to be done before starting anti- | • Hypocalcaemia.<br>• Low GFR < 35 ml/min/1.73 m$^2$.<br>• Low vitamin D < 30 |

| | | | | |
|---|---|---|---|---|
| | | | resorptive therapy if need to be done. | |
| | **Denosumab**<br>*Can be prescribed by Internists or Family Physicians or trained GPs. | • 60 mg SC once every 6 months.<br>• Drug of choice for patient eGFR <35 ml/min/1.73m$^2$<br>• Continue until the patient is no longer high risk 5-10 years.<br>• Discontinuation of Denosumab therapy is linked to rebound increased vertebral fractures. Bisphosphonate therapy is strongly advisable after Denosumab withdrawal.<br>• If to stop Denosumab, give Zoledronic acid (single dose) at the due Denosumab date. | • Low vitamin D and hypocalcaemia.<br>• Repeat bone profile 48 - 72 hours post Denosumab injection in CKD or ESRD.<br>• Rare cases of jaw osteonecrosis (ONJ) has been reported. Hence, a dental work-up is to be done before starting anti-resorptive therapy if needs to be done. | • Hypersensitivity<br>• Hypocalcemia<br>• Not willing to come every 6 months (missing appointment). |

| | | | | |
|---|---|---|---|---|
| **Anabolic drugs** | **Teriparatide (Forteo)**<br>*Prescribed by specialists (ONLY) | • 20 mcg/day injection for 24 months (SC) maximum.<br>• Then sequential therapy with antiresorptive treatment. | • Orthostatic hypotension<br>• Renal failure<br>• Recent urolithiasis | • Hypercalcaemia<br>• Hyperparathyroidism<br>• Paget's disease<br>• Radiation therapy<br>• Skeletal malignancy |

**Table 4: Osteoporosis drugs**

**7.2.3.5. Treatment Monitoring**

**7.2.3.5.1.** Repeat DEXA scans at intervals of 2 -3 years on the same instrument or at least the same type (manufacturer and model type) of the instrument to improve the comparability of results in interpreting any change in BMD.

**7.2.3.5.2.** Shorter intervals between repeat DEXA scans at intervals of one year in very high-risk individuals may be considered. If BMD is stable or improved, then DEXA scan measurement can be done every 2-3 years.

**7.2.3.5.3.** Changes of **<** 5% at the lumbar spine or hip are within the precision error of most DEXA machines and, therefore, should be regarded as representing no significant change.

**7.2.3.5.4.** Compare the BMDs and not T scores.

**7.2.3.5.5.** Consider drug holiday if there is no recent fracture and T-score **>-**2.5 after 5 years of oral bisphosphonates or 3 doses of IV Zoledronic acid.

**7.2.3.5.6.** Monitoring during the drug holiday.

7.2.3.5.6.1. Continue preventive **(Table 3)**.

7.2.3.5.6.2. Repeat BMD after 2 years.

7.2.3.5.6.3. Consider Reinitiation of therapy:

**a)** BMD T-score falls **≤** -2.5.

**b)** BMD decreases greater than 5% at monitored sites.

**c)** New fragility fractures occur.

**7.2.3.6. Treatment failure:**

**7.2.3.6.1.** Declining BMD by more than 5%.

**7.2.3.6.2.** Occurrence of ≥1 fragility fracture.

**7.2.3.7. Referral to specialty care**

**7.2.3.7.1.** Very high risk.

**7.2.3.7.2.** Inadequate response to therapy, despite good adherence**.**

**7.2.3.7.3.** Experiencing serious or unacceptable adverse effects with the available medications.

**7.2.3.7.4.** Continuing to fracture despite normal bone mineral density (BMD).

**7.2.3.7.5.** History of fragility fracture below the age of 50 years.

**7.2.3.7.6.** Early menopause (young females before the age of 45 years with medical or ovarian insufficiency): obstetrics & gynecology specialist to be consulted.

**7.2.3.7.7.** Glucocorticoids induced Osteoporosis, to liaise with the treating physician**.**

**7.2.3.7.8.** Atypical fracture, a side effect of Bisphosphonate.

**7.2.3.7.9.** Secondary causes, according to the specialties. **(See Appendix.2)**.

# CHAPTER THREE

## 8. Responsibilities

**8.1.** Healthcare professionals have a role in educating patients about osteoporosis, risk factors, and distinctive screening modalities.

**8.2.** Considered a primary intervention in the efforts to promote osteoporosis screening and prevention.

**8.3.** The responsibilities of a healthcare professional as shown in the table below:

<table>
<tr><th>Primary health care institution</th><th>Secondary/ Tertiary health care institution</th></tr>
<tr><td>Primary Care Physician (PCP) responsibilities:<br>- Compliance with screening guidelines.<br>- Assess patients for the risk of osteoporosis fracture using a DEXA Scan & FRAX.<br>- Health/Nutrition education.<br>- Management and monitoring.<br>- Refer to specialist when needed.</td><td>Specialist responsibilities:<br>- Compliance with screening guidelines.<br>- Assess patients for risk of osteoporosis fracture for a DEXA Scan.<br>- Health/Nutrition education.<br>- Management and monitoring.</td></tr>
<tr><td colspan="2">Nurse responsibilities:<br>- Check parameters: - Weight, Height, BMI, and Vitals: Blood pressure (BP), pulse, ..etc.</td></tr>
<tr><td colspan="2">Health educator responsibilities:<br>- Provide proper health education and support.</td></tr>
<tr><td colspan="2">Dietitian responsibilities:<br>- Provide proper information and nutritional assessment and advice.<br>- Participate in awareness activities related to osteoporosis nutrition.</td></tr>
<tr><td colspan="2">Pharmacist responsibilities:<br>- Counsel about pharmacological (drug) information and side effects and ensure medication compliance.</td></tr>
<tr><td colspan="2">Radiologist/bone densitometry technologist responsibilities:</td></tr>
</table>

| |
|---|
| - Perform, assist with, and ensure proper preparation, set-up, and completion of experimental tests and procedures utilizing specialized technical equipment and research techniques for bone density and mineral content study. |
| **Laboratory Technician responsibilities:** |
| - Receiving, labeling, and analyzing samples. |

**Table 5:Responsibilities of a healthcare professional**

# CHAPTER FOUR

## 9. Document History and Version Control

| Version | Description | Review Date |
|---|---|---|
| 1 | Initial release | October 2026 |
| 2 | | |
| 3 | | |

## 10. References


| Title of book/ journal/ articles/ Website | Author | Year of publication | Page |
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## 11. Appendix:

### 11.1. Appendix 1: Steroid Dose Equivalents:

| Drug | Equivalent dose (mg) |
|---|---|
| Cortisone | **0.8** |
| Hydrocortisone | **1** |
| Prednisolone | **4** |
| Methylprednisolone | **5** |
| Triamcinolone | **5** |
| Betamethasone | **25** |
| Dexamethasone | **25** |
| Beclomethasone | **50** |
| Budesonide | |
| MP succinate for IV (Solu-Medrol)<br>MP Na Acetate for IM/IA (Depo-Medrol) | |

### 11.2. Appendix 2: Some causes of secondary osteoporosis:

| | |
|---|---|
| **Endocrine** | Acromegaly |
| | Cushing's syndrome |
| | Hyperparathyroidism (frequent) |
| | Insulin-depended diabetes mellitus |
| | Thyrotoxicosis (frequent) |
| **Hypo gonadal** | Anorexia nervosa |
| | Bilateral oophorectomy or orchiectomy |
| | Hyperprolactinemia |
| | Hypogonadism |
| **Drugs** | Aromatase inhibitors (e.g. Tamoxifen), COC, Some anticonvulsant (e.g. Phenytoin) |
| | Glucocorticoids **>** 3months, Long time heparin use |

| | |
|---|---|
| **Hematological disorders/malignancy** | Haemophilia |
| | Mastocytosis |
| | Multiple myeloma (frequent) |
| | Thalassemia |
| **Nutritional and gastrointestinal disorders** | Celiac disease |
| | Gastrectomy |
| | Inflammatory bowel disease (frequent) |
| | Malabsorption |
| | Malnutrition |
| | Post Bariatric Surgery |
| **Neurological disorders** | Muscular dystrophy, Multiple sclerosis |
| | Parkinson's disease |
| | Stroke |
| **Other disorders** | Amyloidosis |
| | Ankylosing spondylitis (frequent) |
| | Chronic obstructive lung disease COPD (frequent) |
| | Chronic renal failure (frequent) |
| | Immobilisation |
| | Organ transplantation |
| | Rheumatoid arthritis (frequent) |
| | Sarcoidosis |
| | Systemic lupus erythematous |

### 11.3. Appendix 3: Risk factors associated with fall: