

## Bone Mineral Density Testing Flowchart

These guidelines were developed by the Provincial Osteoporosis Committee.

### General

- No Risk Factors
- Previous Normal BMD without significant clinical changes
- BMD result would not alter clinical management

**STOP**

### Radiographic Findings

- Vertebral compression fracture (low impact trauma), even if incidental
- Fragility fracture (low impact trauma)  $\geq$  age 40 (♂ or ♀)
- Osteopenia or demineralization on x-ray

### Women and Men

- Men  $\geq$  50 and post menopausal women with at least one major or 2 minor risk Factors (see verso)
- Fragility fracture (any age)
- Age  $\geq$  65

### Children

- BMD should be ordered only on the advice of a qualified specialist

### 2° Osteoporosis

- Prednisone  $\geq$  2.5 mg/day for 3 months or longer
- Chronic diseases / Medications (see verso)

### Repeat Testing

- Anti-resorptive agents  $\geq$  1yr
- Normally, not more often than Q2yr on HRT
- Steroid Treatment: Baseline and at 6–12 months.



See verso for specific  
Osteoporosis Risk Factors  
and Secondary Causes

Contact:  
Acute Care,  
Nova Scotia Department of Health  
1-800-387-6665

# Osteoporosis Risk Factors and Secondary Causes

## for use with Flowchart

\* When ordering BMD studies consideration should be given to how the test will change the patient's management, such as altering counselling regarding activity or changing the therapy.

---

### Major Risk Factors for Osteoporosis

- Age  $\geq$  65 years
- Vertebral compression fracture
- Fragility fracture after age 40
- Family history of osteoporotic fracture (especially hip fracture in mother)
- Propensity to fall
- Appearance of osteopenia on radiograph
- Systemic glucocorticoid therapy of at least 3 months' duration
- Malabsorption syndrome
- Primary hyperparathyroidism
- Hypogonadism
- Early menopause (before age 45)

### Minor Risk Factors for Osteoporosis

- Weight loss of  $>$  10% of weight at age 25
- Weight  $<$  57 kg (125 lbs)
- Smoking
- Excess alcohol intake
- Excess caffeine intake ( $>$  4 cups/day)
- Low dietary calcium intake
- Rheumatoid arthritis
- History of clinical hyperthyroidism
- Long-term anticonvulsant therapy
- Long-term heparin therapy

Note: Risk factors are additive and should not be considered independently of one another. Men age 50 and over, and post menopausal women with at least 1 major or 2 minor risk factors should undergo testing for BMD.

---

## Diseases or Treatments that May Cause Osteoporosis in Children and Adults

- **Endocrine**
  - Acromegaly
  - Addison's Disease
  - Cushing's Syndrome
  - Gonadal insufficiency
  - Hyperparathyroidism
  - Hyperthyroidism
  - Insulin-dependent diabetes
  - Turner's Syndrome
- **Gastrointestinal**
  - Celiac Disease
  - Crohn's Disease
  - Gastrectomy
  - Malabsorption syndromes
  - Nutritional disorders
  - Parenteral nutrition
  - Severe liver disease, especially primary biliary cirrhosis
  - Cystic Fibrosis
- **Hematological**
  - Congenital Porphyria
  - Hemochromatosis
  - Hemophilia
  - Lymphoma and Leukemia
  - Multiple Myeloma
  - Pernicious anemia
  - Thalassemia
- **Renal**
  - Renal failure
  - Renal transplant
- **Respiratory**
  - Sarcoidosis
  - COPD
  - Cystic Fibrosis
- **Drugs:**
  - Adrenocorticotropin
  - Aluminum
  - Anticonvulsants
  - Chemotherapy/Cytotoxic drugs
  - Excessive thyroxine
  - Glucocorticosteroids
  - Prolonged DepoProvera use in teens
  - Heparin
  - LHRH analogs (used for prostate cancer)
  - Lithium
  - Tamoxifen (premenopausal use)
  - Anti-rejection drugs (post transplantation)
- **Miscellaneous**
  - Amyloidosis
  - Anorexia Nervosa
  - Endometriosis
  - Epidermolysis Bullosa
  - Hypophosphatasia
  - Mastocytosis
  - Multiple Sclerosis
  - Poor health/fragility
  - Osteogenesis Imperfecta
  - Post-transplant
- **Neurological**
  - Duchenne's Muscular Dystrophy
  - Cerebral Palsy
  - Quadriplegia
  - Non-weight bearing/Neuromuscular diseases
- **Rheumatological**
  - Ankylosing Spondylitis
  - Idiopathic Scoliosis
  - Rheumatoid Arthritis

---

## Bone Mineral Density Testing in Children

### Please Note:

There are few reports in the literature to support the use of bisphosphonate therapy in children and adolescents, although there is an accumulating literature of case series of treatment of severe osteoporosis. The experience at the IWK has shown a positive benefit, but the experience has been only with very severe cases. The long term safety of this medication in the growing skeleton is not clearly established, although it does not appear to interfere with normal growth, and vertebral bodies which have sustained wedge fractures show reconstitution of their shape during therapy, with improvement of BMD.

The use of bisphosphonates in young girls and women of child bearing age, and future potential effects on a developing fetus have not been established.

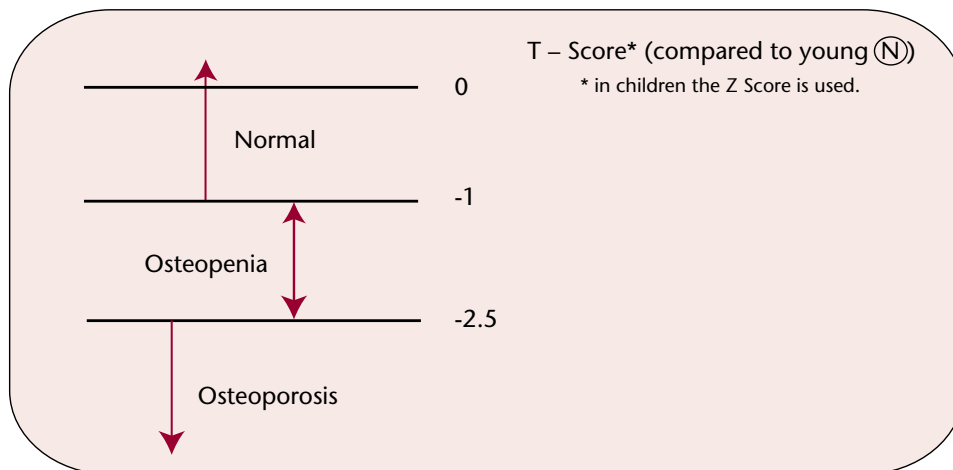
### Bone mineral density studies are indicated for:

- Management of symptomatic osteoporosis in children and adolescents
- Management of rare bone metabolic disorders such as osteogenesis imperfecta
- Detection of osteoporosis in children/adolescents with diseases/therapies known to affect the bone density. Special attention should be paid to children on chronic glucocorticoid administration  $\geq 3$  months

***BMD in childhood should only be ordered on the recommendation of a pediatrician or other specialist with a special interest in metabolic bone diseases.***

---

## World Health Organization Criteria for Osteoporosis



---

## PREVENTION OF OSTEOPOROSIS

- The most important factors in preventing osteoporosis are attaining peak bone mass during childhood and adolescence and maintaining bone mass thereafter.
- Attainment of peak bone mass depends on genetic/ethnic factors, hormonal factors and diet and activity during the late childhood and adolescent years. The peak rate of bone mass accrual occurs in early to mid puberty and declines thereafter (similar timing to the adolescent growth spurt). *Optimizing diet and activity level at this stage would have the most significant impact in preventing osteoporosis.*
- Increasing dietary calcium and vitamin D intake with supplementation where necessary lead to increases in peak bone mass. The best sources of dietary calcium are dairy products and calcium fortified juices. The best source of vitamin D is milk.
- Weight bearing physical activity is an important factor in achieving an optimal peak bone mass and maintaining bone mass in adults; this is especially important in adolescent girls who are accumulating bone mass.
- A good general nutrition as per Canada's Food Guide, also promotes healthy bones.

<b>Recommended Calcium Intakes for Individuals *</b>		
<b>Life Stage Group</b>	<b>Calcium (mg)</b>	<b>Vitamin D (IU)</b>
Birth–6 months	210	200
7–12 months	270	200
1–3 years	500	200
4–8 years	800	200
9–18 years	1300	200
19–50 years	1000	400 **
51–70 years	1500	800 **
70 years +	1500	800 **
<b>Pregnancy and Lactation</b>		
≤ 18 years (or younger)	1300	200
19–50 years	1000	400 **

### **Quick Guide to Calculating Dietary Calcium Intake**

300 mg for each serving for the following:

- 1 cup of milk (any milk, including skim, chocolate, powdered)
- 3/4 cup yogurt
- 1 chunk of cheese (size of a half deck of cards)
- 2 cheese slices
- 1 cup of soya milk
- 1 cup of calcium fortified orange or grapefruit juice
- 3/4 cup milk with 35% more calcium

Add 300 mg for the calcium contained in the rest of the diet (provided the patient is eating an average, well balanced diet).

If unable to consume correct amounts, consider suggesting calcium and vitamin D supplements. Supplements should have a drug identification number (DIN).

#### **Calcium supplements:**

- are best absorbed in frequent small quantities
- are best absorbed when taken with food

#### **Vitamin D Sources/Supplements:**

- milk 1 cup – 100 international units (IU)
- halibut liver oil – 400 IU
- multi-vitamin – 400 IU
- pure vitamin D – 400 and 1000 IU
- no more than 5000 IU of vitamin A should be taken daily (Fish oils such as halibut liver oil are high in vitamin A).

## **Identification of Risk Factors to Prevent Falls**

Falls are both predictable and preventable.

Personal risk factors associated with falls, particularly with the elderly operate in an additive way. The likelihood of a fall increases with the number of risks associated with an individual.

Falls are especially dangerous for people who are unaware that they have low bone mass as they are at a high risk of fracture. The principles of rehabilitation with special focus to strengthening lower extremities and improving balance may be helpful. Those that are at high risk for falls may benefit from the use of hip protectors.

#### **Risk factors for falls:**

- Advanced age
- Neurological conditions: e.g. CVA, Parkinson's Disease
- Impaired cognition and balance
- Slow gait and diminishing reflexes
- Poor vision
- Loss of muscle mass
- Foot problems or inappropriate footwear
- Medications may cause falls, such as Benzodiazepines, Antidepressants (even non-sedating ones), Antihypertensives that cause postural hypotension.
- Environmental hazards: scatter rugs, electric wires and poor lighting, reaching for household items on top of shelves, climbing on chairs or boxes to reach a specific item, slippery or wet floors.

\* Dietary reference intakes for calcium, phosphorous, magnesium, vitamin D, and fluoride 1997. National Academy Press, Washington, DC.

\*\* Osteoporosis Society of Canada (2002)