

clinical practice guideline for the
**prevention, diagnosis and
treatment of adult osteoporosis**

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Goals

1. Provide effective and efficient screening criteria for all adults at risk for osteoporosis.
2. Provide osteoporosis primary prevention guidelines for all adults.
3. Provide treatment guidelines for adults with advanced osteopenia, osteoporosis, or history of an osteoporotic fracture.
4. Reduce practice variability in the care of adults at risk for osteoporosis or with a history of osteoporosis or osteoporotic fracture.

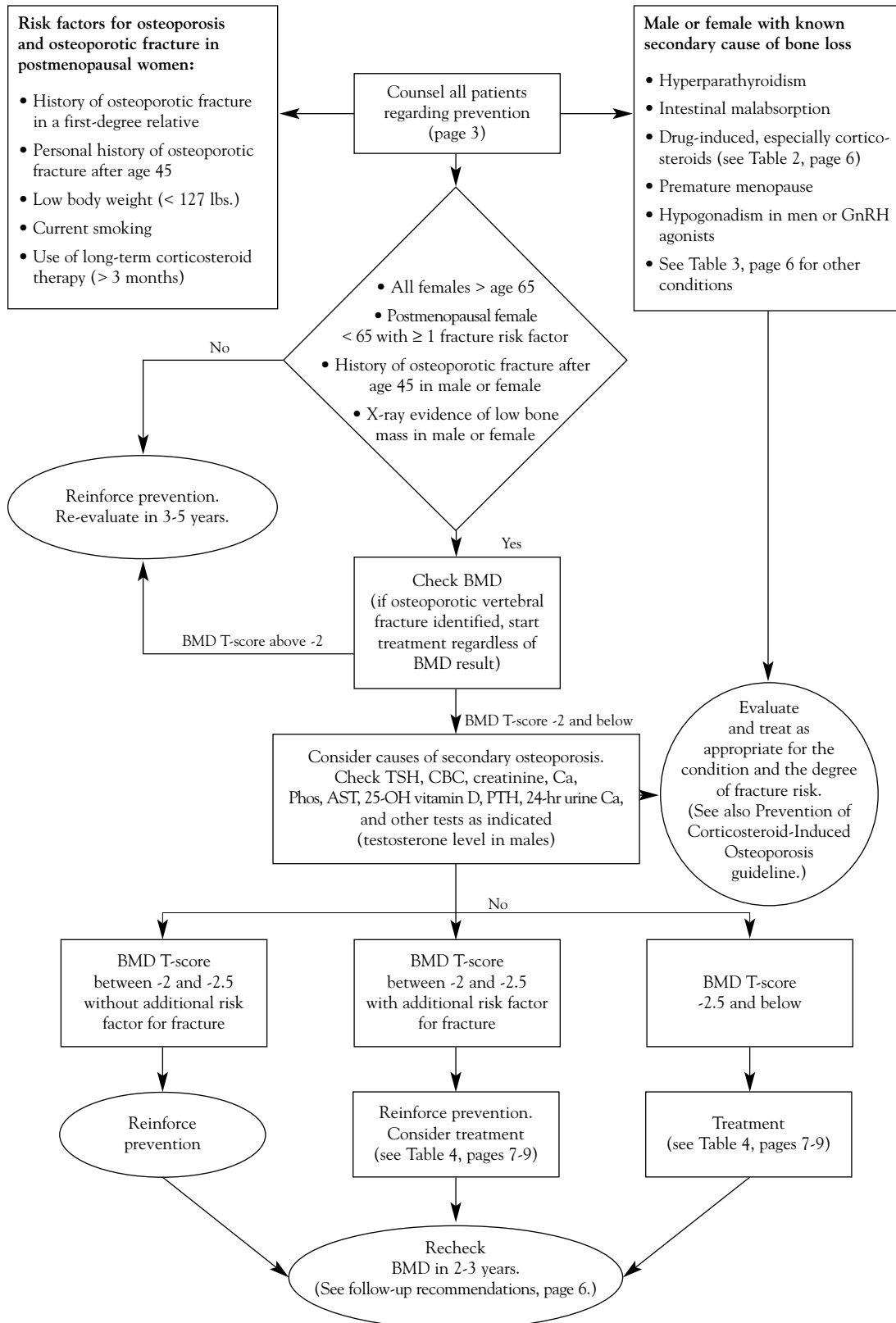
Limitations

The Clinical Practice Guidelines Committee (CPGC) provides this document for the educational benefit of the practitioners contracted with Fallon Community Health Plan. **This document is a guideline. The synthesis of the enclosed recommendation is not meant to replace any practices based on personal training, clinical judgment, experience or specific aspects of individual patient situations.**

Timetable

Final approval by the Clinical Practice Guidelines Committee: December 3, 1999
First revision: June 2001
Second revision: August 2004

Adult osteoporosis guideline algorithm



A stable or increased bone density is the goal of therapy.

Introduction

Osteoporosis is a silent disease with tremendous consequences, especially for older adults. Over the last decade, major advances have been made in the field; we now have excellent screening tests to identify adults at risk of developing osteoporotic fractures, as well as several new treatment options. The ultimate goal of screening and disease management is to prevent fractures. This guideline offers a standardized approach to disease prevention, screening, and treatment. It is based on the most current medical literature and published treatment guidelines. This is a rapidly changing field, and future updates will be released as needed.

Prevention

Calcium

Individuals of all ages should be counseled regarding total recommended daily calcium intake. The most recent recommendation from the National Academy of Sciences (1997) is that adults between the ages of 19 and 50, including pregnant or lactating women, consume 1000 mg of calcium daily. Adults age 51 and older should consume 1200 mg daily. Children and teenagers between the ages of 9 and 18 should consume 1300 mg daily. The total dietary calcium intake can be estimated (Table 1, page 6) and additional calcium provided through dietary changes or supplements.

Calcium supplements are most efficiently absorbed at dosages of 500-600 mg or less. Calcium carbonate tablets are the least expensive, but require the presence of gastric acid for absorption. Individuals with reduced gastric acid production should take supplements at meal times or use calcium citrate tablets, which do not require gastric acid for absorption. Those patients who have GI intolerance to calcium carbonate may tolerate calcium citrate or gluconate better. There is no benefit to exceeding the recommended daily intake of calcium.

Vitamin D

In the Northeast, where there is low sun exposure for many months each year, vitamin D levels can be deficient, and thus vitamin D supplementation is recommended. The daily dosage should be 400 IU per day (one multiple vitamin) except in elders (age > 65), where the dosage is 800 IU per day.

Exercise

Weight-bearing exercise on a regular basis should be encouraged to help maintain bone mass, strength and balance so as to reduce the risk of falling. Although the optimal exercise recommendations are unknown, 30-60 minutes of walking 3-5 times a week are suggested. Non-weight-bearing activities, such as biking and swimming, are less effective at maintaining bone mass.

Fall avoidance

Since the majority of wrist and hip fractures occur with falls, high-risk patients should be counseled regarding use of assistive devices (canes, walkers, handrails, etc.), safe footwear, corrective eyeglasses, unobstructed home walking space, bathroom safety and appropriate lighting. Sedating and hypotension-inducing medications should be used judiciously. Undergarments with protective hip pads should also be considered in frequent fallers.

Smoking and alcohol

Patients should be counseled not to smoke. Alcohol consumption should be limited to moderate levels (≤ 2 drinks/day).

Screening

BMD testing combined with a risk factor history is the best mechanism to screen for osteoporosis and predict future fracture risk. The following groups of adults should be considered for BMD testing (provided the result would influence treatment decisions):

- All ambulatory women age 65 or older
- Postmenopausal women less than 65 years old who have at least one of the following risk factors for low bone density:
 - History of an osteoporotic fracture* in adulthood**
 - Low body weight (< 127 lbs.)**
 - Current smoker**
 - History of osteoporotic fracture (hip, wrist, vertebrae) in first-degree relative**
 - Menopause before age 45 or prolonged premenopausal amenorrhea (> 1 year)
 - X-ray report noting osteopenia or demineralization
 - Current excessive alcohol consumption (≥ 3 drinks a day)
 - History of medication usage associated with increased risk for osteoporosis (Table 2, page 6)
 - History of disease associated with increased risk for osteoporosis (Table 3, page 6)
- Men with hypogonadism including those on GnRH agonist therapy, or X-ray report of osteopenia or history of osteoporotic fracture

Diseases that secondarily cause low bone mass or accelerated loss (Table 3, page 6) should always be considered since treatment may be different than for primary osteoporosis. Patients who have a T-score below -2.0 should be evaluated with laboratory tests (e.g., TSH, calcium, phosphorus, CBC, AST, creatinine, 25-OH vitamin D level, 24-hour urine for Ca, and others as dictated by circumstances) to help screen for these conditions.

* An osteoporotic fracture is one that would be unlikely to occur with low trauma in a normal young adult. This excludes fractures from significant trauma (e.g., motor vehicle accident or ski accident) and includes fractures from minor events such as a fall from body height.

** These four factors, as well as low bone density, were identified as most useful to predict hip fracture in a recent National Osteoporosis Foundation analysis.

Diagnosis

The most reliable technique to diagnose osteoporosis is by dual X-ray absorptiometry (DXA) bone density testing. The T-score, which compares the patient's bone mineral density (BMD) in standard deviations (SD) with the average peak (young adult) bone density of the reference database, is the key to diagnosis.

Because bone is neither accrued nor lost at equal rates at different skeletal locations, DXA screening should ideally be done at two sites. Base the diagnosis on the lowest T-score of the sites scanned. Generally, the lumbar spine and the proximal femur (hip) are the best sites to screen. However, as patients age, the prevalence of osteoarthritis in the lumbar spine increases and can interfere with the diagnostic usefulness of the test by increasing the apparent BMD in the AP projection. Likewise, history of fracture, osteoarthritis, or total hip replacement may affect the diagnostic usefulness of the proximal femur scan. In such situations, consideration should be given to scanning the proximal forearm (33% radius site) if osteoporosis is not already diagnosed.

The following are the World Health Organization (WHO) criteria for diagnosing osteoporosis by BMD:

Normal:	T-score above -1.0
Osteopenia:	T-score between -1.0 and -2.5
Osteoporosis:	T-score -2.5 or below
Severe osteoporosis:	T-score -2.5 or below with an osteoporotic fracture (hip, wrist, vertebrae)

The measurement of peripheral sites (ultrasound of heel or tibia and DXA of heel or finger) has gained some popularity as a screening test because the machines are portable and less expensive. Unfortunately, the specific cut-points for the diagnosis of osteoporosis with these devices are not well established. Consequently, any patients with a below-normal score on a peripheral measurement test should be considered a candidate for central DXA scanning. In addition, these devices should not be used for monitoring response to therapy.

Treatment

Drug treatment is recommended for all patients diagnosed with osteoporosis by DXA or a history of prior osteoporotic fracture, as these groups are the most likely to have future fractures and experience the greatest fracture reduction with treatment. Medications can also be considered in adults with a T-score between -2 and -2.5 if they have one or more risk factors for future fracture. This decision needs to be individualized, based on the assessment of the patient's risks for fracture and preference. Patients deemed to be at higher risk (e.g., elderly with history of falling) should be treated, while those felt to be at lower risk (e.g., younger patients with only one risk factor) could maximize preventive measures and have the BMD repeated in 2-3 years.

The bisphosphonates alendronate (Fosamax[®]) or risedronate (Actonel[®]) should be considered as first-line treatments since studies have confirmed that they prevent all types of osteoporotic fractures. If bisphosphonates are not tolerated or contraindicated, the selective estrogen receptor modulator (SERM) raloxifene (Evista[®]) can be recommended, but data only supports vertebral fracture protection. Nasal calcitonin (Miacalcin[®]) is an alternative if the others are not options.

The synthetic PTH teriparatide (Forteo[®]) can be used in cases of severe osteoporosis. Treatment is generally followed by bisphosphonates. The first generation bisphosphonate etidronate (Didronel[®]) is another alternative that has been shown to prevent vertebral fracture but is not FDA-approved for osteoporosis treatment.

The Women's Health Initiative reported that the risks associated with combined hormone replacement therapy (estrogen and progestin) and estrogen alone (ERT) outweigh the benefits in postmenopausal women regardless of baseline fracture risk. Data regarding the relative strength of evidence for fracture prevention is summarized in Table 5, page 9. Much more detailed prescribing and relative cost information is listed in Table 4, pages 7-9.

There may be circumstances in which the treating physician and patient decide the benefits of estrogen in preventing fractures outweigh the risks associated with hormone replacement therapy.

Follow-up

The follow-up interval for BMD testing is determined by the anticipated rate of change from the disease process and/or treatment intervention at the site being examined and the measurement precision at the scan site. In general, don't order repeat scans sooner than 2-3 years unless large rates of change are anticipated (e.g., high-dose corticosteroid treatment or teriparatide treatment). Generally, a satisfactory result is a stable (within the precision range) or increasing BMD. To keep testing error to a minimum, try to have the repeat scan done on the original scanner if possible. BMD values from different manufacturers' machines are not directly comparable. When analyzing repeat scans, compare only the lumbar spine and total hip sites. Expect more rapid and significant changes at the lumbar spine since it is higher in trabecular bone content. The greatest BMD changes occur with teriparatide, alendronate and risedronate; however, there does not appear to be a 1:1 relationship between the amount of BMD increase and fracture risk reduction. Other factors, such as turnover rate and bone architecture, are important as well.

Future considerations

There are several areas concerning bone mineral density testing and osteoporosis management for which there is currently insufficient evidence to make specific recommendations.

The role of unopposed ERT for osteoporosis prevention or treatment in women after menopause who have had a hysterectomy has not been established. In younger women, HRT (combined HRT or unopposed ERT) should be considered until the expected age of menopause but cannot be recommended on the basis of proven benefit for osteoporosis or fracture prevention in this setting.

The literature does not provide adequate data to recommend a specific age at which to consider routine BMD monitoring in men at this time. Males should be tested if there is a specific indication. Medicare does not cover routine screening based on age alone in males at this time.

Table 1

Estimating daily dietary calcium intake			
Food type	Typical calcium content	Number of servings	Total
1 slice cheese	200 mg	X _____	=
8 oz milk	300 mg	X _____	=
8 oz calcium fortified orange juice	300 mg	X _____	=
8 oz yogurt	400 mg	X _____	=
Estimate of daily calcium from other dietary sources			= 300 mg
Total daily dietary calcium			= ____ mg

Table 2

Common drugs associated with increased risk of osteoporosis	
Glucocorticoids	Excessive thyroxine replacement
Phenytoin	Heparin (long-term use)
Phenobarbital	Cyclosporine
GnRH agonists	Tamoxifen (premenopausal usage)
Progesterone (long-acting parenteral)	Others

Table 3

Diseases associated with increased risk of osteoporosis	
Cushing's syndrome	Rheumatoid arthritis
Hyperparathyroidism	Postgastrectomy
Lymphoproliferative disorders	Severe renal disease
Mastocytosis	Severe hepatic disease
Multiple myeloma	Thyrotoxicosis
Malabsorption syndromes (e.g., Crohn's disease or celiac sprue)	Prolonged premenopausal hypogonadism (e.g., anorexia nervosa, athletic amenorrhea, GnRH therapy)
	Others

Table 4, continued

Osteoporosis therapies	
Bisphosphonates	
The preferred treatment for most men and women with osteoporosis	
<p>Alendronate (Fosamax®) 70 mg weekly or 10 mg daily</p> <p style="text-align: center;">or</p> <p>Risedronate (Actonel®) 35 mg weekly or 5 mg daily</p>	<p>Indication: Treatment and prevention of postmenopausal osteoporosis and treating male osteoporosis.</p> <p>Effects: Increased bone density in the spine by 5-8% and at the hip by 3-5% after three years. Reduced incidence of spine fractures (40-70%) and non-spine fractures (20-40%), including hip fractures (40-60%) in women with osteoporosis.</p> <p>Side effects: Bisphosphonates have been associated with upper esophageal symptoms such as esophagitis, esophageal ulcers or dysphagia in some patients. The effect is minimized by proper dosing.</p> <p>Contraindications: Hypocalcemia; esophageal stricture; allergy to bisphosphonates; inability to sit or stand for at least 30 minutes; pregnancy; breastfeeding.</p> <p>Other considerations: Tablets should be taken on an empty stomach after an overnight fast with plain water (6-8 oz) while sitting in an upright position. Patients should not eat or lie down for at least 30 minutes. Calcium and vitamin D should be prescribed with bisphosphonates but administered separately, at least 2 hours after the dose, to prevent inhibited absorption of the drug.</p> <p>Cost: \$900-960/yr</p>
<p>Etidronate (Didronel®) 400 mg daily for 2 of every 13 weeks</p>	<p>Indication: Treatment of osteoporosis in adults (not FDA-approved) unable to take second generation bisphosphonates and not candidates for other FDA-approved therapies.</p> <p>Effects: Increases BMD of lumbar spine by 4.1% and femoral neck by 2.4%. Reduced incidence of spine fractures by 37%. No effect on nonvertebral fractures.</p> <p>Side effects: Bisphosphonates have been associated with upper esophageal symptoms such as esophagitis, esophageal ulcers or dysphagia in some patients. The effect is minimized by proper dosing.</p> <p>Contraindications: Hypocalcemia; esophageal stricture; allergy to bisphosphonates; inability to sit or stand for at least 30 minutes; pregnancy; breastfeeding.</p> <p>Other considerations: Administered p.o. for two weeks every three months. Tablets should be taken on an empty stomach after an overnight fast with plain water (6-8 oz) while sitting in an upright position. Patients should not eat or lie down for at least 30 minutes. Calcium and vitamin D should be prescribed with bisphosphonates but administered separately, at least 2 hours after the dose, to prevent inhibited absorption of the drug.</p> <p>Cost: \$400-500/yr</p>

*Table 4 referenced with modification from the Guidelines for Osteoporosis Management 2003, Oregon Osteoporosis Center.

Table 4, continued

Osteoporosis therapies	
SERM An alternative for treating women with spinal osteoporosis	
Raloxifene (Evista®) 60 mg daily	Indication: Treatment and prevention of postmenopausal osteoporosis. Effects: Increased spine and hip bone density by 2-3% after three years. Reduced incidence of vertebral fractures (30-50%) in women with postmenopausal osteoporosis. No effect on nonvertebral fractures has been observed. Too few hip fractures occurred to evaluate treatment effect. Side effects: Increased hot flashes, leg cramps and venous thrombotic events. Contraindications: History of venous thrombotic events; allergy to raloxifene; pregnancy. Other considerations: Lowers LDL without affecting HDL or triglyceride levels. Effects on cardiovascular events have not been assessed. May reduce incidence or delay diagnosis of breast cancer in older postmenopausal women, although use in women known to have breast cancer has not been evaluated. Cost: \$1,033/yr
Nasal calcitonin An alternative if use of other drugs not possible	
Calcitonin (Miacalcin® Nasal Spray) 200 IU daily	Indication: Treating postmenopausal women with osteoporosis. Effects: Very small effect on bone density. Reduced incidence of vertebral fractures (36%) in women with pre-existing vertebral fractures. No effect on nonvertebral fractures has been observed. Side effects: Nasal stuffiness. Contraindications: Hypocalcemia; allergy to calcitonin; pregnancy. Cost: \$950-1,000/yr
Synthetic PTH For treatment of patients at high fracture risk	
Teriparatide (Forteo®) 20 mcg daily by subcutaneous injection	Indication: Treating postmenopausal women with osteoporosis and men with low bone density who are at high fracture risk. Examples would include patients with multiple vertebral fractures very low BMD T-scores. Effects: Increased bone density in the spine by 9.7% and in the total hip by 2.6% after 21 months. Reduced incidence of vertebral fractures by 65% and nonvertebral fractures by 53% in women with pre-existing vertebral fractures. Too few hip fractures occurred to evaluate treatment effect. Side effects: Dizziness, leg cramps, transient hypercalcemia, increased serum uric acid. Contraindications: Other bone disease such as Paget's disease, bone malignancies (myeloma) or other cancers metastatic to bone; history of high-dose skeletal irradiation, hypercalcemia or hyperparathyroidism; children or young growing adult; pregnancy and breast feeding. Other considerations: Use beyond 24 months not recommended. Teriparatide treatment in rats caused osteosarcoma. Cost: \$6,084/yr

Table 4, continued

Osteoporosis therapies	
Estrogen replacement therapy	
Esterified estrogen (Menest®) 0.3 mg or 0.625 mg daily	<p>Indication: Prevention of bone loss in postmenopausal women.</p> <p>Effects: Increased spine density by 6-8% after 3 years. Reduced vertebral, hip and other fragility fractures by 34% after five years in a large cohort of postmenopausal women (average age 63) at low fracture risk.</p> <p>Side effects: Increased risk of breast cancer; stroke; venous thrombosis; gall bladder disease; heart disease in first year of treatment.</p> <p>Contraindications: Breast cancer, unexplained vaginal bleeding, history of venous thrombotic events or previous heart attack.</p> <p>Other considerations: Not approved for treating women known to have osteoporosis. Controls menopausal symptoms such as hot flashes. Long-term therapy not recommended for prevention of heart disease or bone loss.</p> <p>Cost: \$130-215/yr</p>

Table 5*

Strength of fracture-protection data			
Not a comparison of effectiveness but of quality of data supporting fracture reduction			
Medication	Spine fracture	Non-spine fracture	Hip fracture
Risedronate (Actonel®)	+++	++	++
Alendronate (Fosamax®)	+++	++	++
Raloxifene (Evista®)	+++	0	0
Calcitonin (Miacalcin®)	+	0	0
Teriparatide (Forteo®)	+++	++	0
Estrogen	+	+	+
KEY: +++=Strong evidence; ++=Very good evidence; +=Some evidence; 0=No evidence			

*Table 5 referenced with modification from the Guidelines for Osteoporosis Management 2003, Oregon Osteoporosis Center.

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