

GUIDELINES & PROTOCOLS

ADVISORY COMMITTEE

Bone Density Measurement in Women

Revised 2005

Scope

This guideline defines the medical necessity of bone mineral density (BMD) measurement using dual-energy x-ray absorptiometry (DXA or DEXA), and applies to adult women 19 years of age and older. Currently, 94% of DXA scans in British Columbia are performed on female patients. This guideline outlines age and risk factors that are indications for medically necessary BMD testing. While many of the same indications for BMD testing apply to men as well as women, it is not the intent at this time to address BMD testing in men. Currently, insufficient data exist on the relationship between bone mineral density and risk of fracture in men.¹

Bone mineral density measurements are used to assess fracture risk. Osteoporotic fractures are very unusual in women under 50-55 years of age, even those with somewhat reduced bone density. Therefore, bone density measurements are rarely indicated in people under 50-55 years of age without evidence of considerable risk.²

RECOMMENDATION 1 Screening

Bone mineral density (BMD) measurement is not recommended as a screening procedure for women under 65 years of age, nor as part of routine evaluation around the time of menopause.

RECOMMENDATION 2 Appropriate Indications for BMD Measurement Using DXA

BMD measurement should only be performed when:

1. The results are likely to alter patient care;^{3,4} **and**
2. Patients have at least one major or two minor risk factors for osteoporosis (see Table 1 on page 2)

BMD may be of value in assessing the risks and potential benefits of pharmacotherapy in women with risk factors for osteoporosis.

Appropriate lifestyle modification should be recommended irrespective of BMD results.

Table 1: Risk Factors for Osteoporosis (modified from¹)

Major Risk Factors	Minor Risk Factors
<ul style="list-style-type: none"> • Age ≥ 65 years • Low trauma vertebral compression fracture • Low trauma fracture over age 40 • Family history of osteoporotic fracture (especially maternal hip fracture) • Current systemic glucocorticoid therapy of > 3 mos duration • Malabsorption syndrome • Primary hyperparathyroidism • Hypogonadism • Early menopause (before age 45) 	<ul style="list-style-type: none"> • Past history of clinical hyperparathyroidism • Chronic anticonvulsant therapy • Low dietary calcium intake • Smoking • Excessive alcohol intake • Excessive caffeine intake (eg. > 4 cups coffee/day) • Weight < 57 kg • Short term weight loss > 10% from weight at age 25 • Chronic heparin therapy • Rheumatoid arthritis

RECOMMENDATION 3 Low-Trauma Fractures/Measured Loss of Height

Where other disease has been ruled out, patients with low-trauma, (also known as fragility) fractures*, have osteoporosis and should be treated accordingly. BMD measurement is not required to confirm osteoporosis in such cases, but may be useful as a baseline against which to measure the effects of treatment in cases when it is contemplated.

Patients with a significant measured loss of height amounting to at least 2 cm in one year, or 5 cm over a lifetime, (not resulting from other causes, including neoplasm or infection), can be assumed to have osteoporosis without BMD measurement.

*The World Health Organization (WHO)⁵ defines fragility fracture as, “a fracture caused by injury that would be insufficient to fracture normal bone: the result of reduced compressive and/or torsional strength of bone.” The Canadian guidelines for osteoporosis¹ further suggests a fragility fracture may be defined as, “one that occurs as a result of minimal trauma, such as a fall from standing height or less, or no identifiable trauma.”

RECOMMENDATION 4 Inappropriate Indications for BMD Measurement

Chronic Back pain: Only about one-third of low-trauma vertebral fractures cause symptoms. The pain of low trauma vertebral fractures, if it occurs, is usually of relatively acute onset. Therefore, without other risk factors for osteoporosis, BMD measurement is not indicated for long-standing back pain.

Kyphosis: While dorsal kyphosis is often associated with vertebral fracturing, there are other causes of the condition. In the absence of other reasons to do densitometry, kyphosis is best first investigated by obtaining lateral thoracic spine x-rays (radiographs) to rule out anterior compression fractures.

Menopause: There is no indication for routine perimenopausal bone density measurement in the absence of risk factors.

RECOMMENDATION 5 Follow-Up Bone Density Measurements

Follow-up bone density measurements are not considered necessary prior to two years after the original measurement except:

- in patients receiving ≥ 7.5 mg prednisone daily or its equivalent for three months consecutively who require a baseline examination and repeat scans at six-month intervals while on treatment;
- in patients with existing fractures or with very low bone density in whom an earlier examination may be indicated.

The response to many of the drugs used to treat osteoporosis is characterized more by a reduction in fracture incidence than by an increase in bone density. Follow-up measurements of bone density should be interpreted with this fact in mind.

Rationale

Measurement of bone density may be useful in specific clinical circumstances to assist in management decisions and therapeutic choices. Low trauma fractures in certain disease states and in the elderly, are causes for concern, but loss of bone mineral is only one of many risk factors for fracturing. Many individuals with low bone density do not progress to fracture and many with normal bone densities do suffer from fractures. Management decisions based on bone density alone, therefore, may lead to over-treatment or false reassurance, as well as detract from other important management issues such as diet, exercise and prevention of falls. However, if a patient's decision to initiate or comply with therapy is dependent upon the results of bone density measurement, then such measurement may be appropriate.

In assessing response to treatment, either an increasing or stable bone mineral density can be interpreted as a satisfactory treatment response. Reliable follow-up DXA measurements are best obtained using the same machine, in the same facility, at the same time of year. The rate of change of BMD with age or treatment is usually small (circa 0.5-1.0%); given the precision of the test, any changes except in specific circumstances, will not usually be detectable in less than 2 years.

In recent years, the availability of quantitative ultrasound testing for osteoporosis has proliferated in nonaccredited facilities. The findings may not be reliable, tend to overestimate the presence of osteoporosis, and are unsatisfactory for use in follow-up.⁶

References

1. Brown JP, Josse RG. Scientific Advisory Council of the Osteoporosis Society of Canada. 2002 Clinical Practice Guidelines for the Diagnosis and Management of Osteoporosis in Canada, Revised 2002. CMAJ 2002 Nov 12;167(10 Suppl):S1-34.
2. Cummings SR, Black DM, Nevitt MC, et al. Bone density at various sites for prediction of fractures. Lancet 1993; 341:72-5.
3. Eddy DM, Johnston CC, Cummings SR, et al. Osteoporosis: review of the evidence for prevention, diagnosis and treatment and cost-effectiveness analysis. Osteoporos Int 1998; 8:S1-S88.
4. Khan AA, Brown JP, Kendler DL, et al. The 2002 Canadian bone densitometry recommendations: take-home messages. CMAJ 2002 Nov 12;167(10):1141-5.
5. Guidelines for preclinical evaluation and clinical trials in osteoporosis. Geneva: WHO; 1998:59.
6. American College of Obstetricians and Gynecologists Committee on Gynecologic Practice. Bone density screening for osteoporosis. Int J Gynaecol Obstet 2002 Jun;77(3):299-301. Abstract.

Sponsors

This guideline, revised by the Bone Density Working Group, subcommittee of Guidelines and Protocols Advisory Committee, supersedes the Protocol for *Bone Density Measurement* developed in 1999. This revision has been approved by the British Columbia Medical Association and adopted by the Medical Services Commission.

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- to encourage appropriate responses to common medical situations
- to recommend actions that are sufficient and efficient, neither excessive nor deficient
- to permit exceptions when justified by clinical circumstances.

Bone Density Measurement

A GUIDE FOR PATIENTS

What is osteoporosis?

Bone is a living, growing tissue. It contains proteins and minerals that are arranged in a honeycomb-like structure called a matrix. The larger the amount of minerals, the higher the density. However, it is the combination of mineral deposits (bone density) and the microscopic structure (matrix) that gives bone its overall strength. Your body is constantly making new bone tissue and breaking down older bone. During your youth, your bone mineral deposits are greater than bone loss. At some point as a young adult, your skeleton reaches peak bone mass. After this point, bone loss slowly begins to outpace bone growth. Your bones naturally become less dense and weaker with age. Osteoporosis (“porous bone”) is a disease characterized by low bone mass and deterioration of bone tissue which leads to increased bone fragility and risk of fracture. It is most common in post-menopausal women, but may also occur in men and in people who have certain diseases or take particular medications.

How do I know if I have osteoporosis?

You may not know you have osteoporosis as it typically progresses without symptoms and may not become apparent until a fracture occurs. You may even have a fracture and be unaware of it unless it is diagnosed on an x-ray. The first sign of osteoporosis may be a decrease in height, rounded shoulders, and hip or back pain. A broken bone after a minor fall may also indicate osteoporosis. If your doctor suspects osteoporosis, he or she may recommend a test to measure your bone density.

What is bone mineral density (BMD) measurement?

BMD measurement is a diagnostic test used to measure the amount of mineral in bones. The most commonly used test is dual energy x-ray absorptiometry (DXA). It involves lying on a table for 10-20 minutes while a low dose x-ray beam scans your spine, hip or both. The test involves no pain and no known risk other than minimal radiation exposure.

What does bone density measurement show?

BMD measurement only measures the amount of mineral in bones, not microscopic bone structure. Since bone strength depends on both bone density and microscopic bone structure, BMD measurement cannot provide a complete assessment of bone strength. The results are compared to the range of measurements occurring in normal young adults. Based on this comparison, you may be told that your bone density is normal or that you have osteoporosis or osteopenia (reduced bone density). Because bone density naturally decreases with age, most older people will have lower bone density than young adults. According to one estimate, approximately 66% of B.C. women over 40 years-of-age would be considered to have osteoporosis or osteopenia when their bone density results are compared to those of young adults.

Why is bone density testing so controversial?

Just about every aspect of bone research is a matter of debate. Several scientific reviews of the evidence have concluded that BMD measurement is poor at predicting which women will go on to have a fracture in later life. There are a number of reasons for this.

Bone density is only part of what determines strength in bone. Bone strength cannot be measured directly since it depends on both bone density and microscopic bone structure, and there is no simple test to measure microscopic bone structure.

Low bone density is only one of many factors that can increase the risk of fracture. Factors such as inactivity, balance problems, poor vision, inappropriate footwear, the use of certain drugs, and household hazards can all increase the risk of falling and fracturing a bone. Some people believe that bone density testing and medical treatment of osteoporosis are examples of the “medicalization” of natural processes such as menopause and aging. “Medicalization” means treating natural processes like diseases and relying too heavily on highly technological medical treatments when less invasive approaches could be just as beneficial. However, bone density testing can provide valuable information and help women decide when hormone or drug treatment may be beneficial.

Despite these controversies, there is general agreement that doing some simple things can protect your bones. No matter what your bone density, it is a good idea to get enough calcium, participate in regular weight-bearing exercise, avoid smoking, and remain as active and medication-free as your health allows.

Bone density testing may not be perfect, but it is currently the most accurate test available for osteoporosis.

For ongoing BMD monitoring it is important for you to attend the same facility at the same time of year, if possible, to get the most accurate BMD assessment because no two DXA machines are exactly alike.

When does the Medical Services Plan (MSP) pay for bone density tests?

MSP policy is to provide coverage for services that are considered medically necessary. The guideline for Bone Density Measurement, developed by doctors in B.C., outlines the most common circumstances when bone density tests are considered medically necessary. Generally speaking, MSP will pay if the results would affect decisions about your treatment. In order for MSP to pay, your doctor must explain why you need the test on the order form when referring you for bone density testing.

MSP does not pay for bone density tests unless they are necessary to make treatment decisions.

BMD may be of value in assessing the risks and potential benefits of pharmacotherapy in women with risk factors for osteoporosis.

RISK FACTORS FOR OSTEOPOROSIS (Modified from 1)

Major Risk Factors	Minor Risk Factors
<ul style="list-style-type: none">• Age \geq 65 years• Low trauma vertebral compression fracture• Low trauma fracture over age 40• Family history of osteoporotic fracture (especially maternal hip fracture)• Current systemic glucocorticoid therapy of $>$ 3 mos duration• Malabsorption syndrome• Primary hyperparathyroidism• Hypogonadism• Early menopause (before age 45)	<ul style="list-style-type: none">• Past history of clinical hyperparathyroidism• Chronic anticonvulsant therapy• Low dietary calcium intake• Smoking• Excessive alcohol intake• Excessive caffeine intake (e.g. $>$ 4 cups coffee/day)• Weight $<$ 57 kg• Short term weight loss $>$ 10% from weight at age 25• Chronic heparin therapy• Rheumatoid arthritis

PREVENTION OF BONE LOSS AND FRACTURES

Things you can do to reduce bone loss

- Make sure you get enough calcium and Vitamin D
- Avoid smoking
- Avoid rapid weight loss
- Participate in regular weight-bearing exercise (walking, running, weight training or aerobics)

Things you can do to prevent falls

- Exercise regularly
- Avoid heavy alcohol use
- Wear low-heeled shoes with firm, non-slip soles
- Have regular vision checks and wear glasses if needed
- Take safety measures to prevent falls in the home
- Avoid tranquilizers and sleeping pills, which could make you dizzy or unsteady

Things to discuss with your doctor if you have osteoporosis

- Lifestyle and diet changes
- Drug therapies
- Whether any of your medications could cause dizziness or loss of balance

References

1. Brown JP, Josse RG. Scientific Advisory Council of the Osteoporosis Society of Canada. 2002 Clinical Practice Guidelines for the Diagnosis and Management of Osteoporosis in Canada, Revised 2002. CMAJ 2002 Nov 12;167(10 Suppl):S1-34.

For various perspectives on osteoporosis and bone density testing, contact the following:

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