Clinical Practice Guideline: **Bone Density Screening – Peripheral**

Date of Implementation: **July 13, 2006**

Product: **Specialty**

GUIDELINES

American Specialty Health – Specialty (ASH) considers Peripheral Bone Density Screening medically necessary when following United States Preventive Services Task Force (USPSTF) guidelines.

The current US Preventive Services Task Force (USPSTF) recommends screening for osteoporosis with bone measurement testing to prevent osteoporotic fractures in women 65 years and older. The USPSTF recommends screening for osteoporosis with bone measurement testing to prevent osteoporotic fractures in postmenopausal women younger than 65 years who are at increased risk of osteoporosis, as determined by a formal clinical risk assessment tool. (June 2018). Risk factor determination should be performed using the FRAX tool or another valid and reliable tool. The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for osteoporosis to prevent osteoporotic fractures in men. The most commonly used bone measurement test used to screen for osteoporosis is central dual-energy x-ray absorptiometry (DXA); other screening tests include peripheral DXA and quantitative ultrasound (QUS). Central DXA measures bone mineral density (BMD) at the hip and lumbar spine. Most treatment guidelines recommend using BMD, as measured by central DXA, to define osteoporosis and the treatment threshold to prevent osteoporotic fractures.

DESCRIPTION/BACKGROUND

Several tools are available to assess osteoporosis risk: the Simple Calculated Osteoporosis Risk Estimation (SCORE; Merck), Osteoporosis Risk Assessment Instrument (ORAI), Osteoporosis Index of Risk (OSIRIS), and the Osteoporosis Self-Assessment Tool (OST). These tools seem to perform similarly and are moderately accurate at predicting osteoporosis. The FRAX tool (University of Sheffield), which assesses a person's 10-year risk of fracture, is also a commonly used tool. The FRAX tool includes questions about previous DXA results but does not require this information to estimate fracture risk. Because the benefits of treatment are greater in persons at higher risk of fracture, one approach is to perform bone measurement testing in postmenopausal women younger than 65 years who have a 10-year FRAX risk of major osteoporotic fracture (MOF) (without DXA) greater than that of a 65-year-old white woman without major risk factors. Bone density measurement is performed as a screen for conditions such as osteopenia and osteoporosis, bone weakening conditions due to bone resorption occurring at a faster rate than bone formation. This change in bone density can be due to aging or disease processes

and is related to a multitude of factors, including hormonal changes, calcium consumption, diet, and level of physical activity. Having osteopenia and/or osteoporosis is a risk factor for fracture, and because these disease processes begin weakening bones long before fractures occur, early screening for, and treatment of, decreased bone density can be useful for preventing fractures. Studies have shown that screening those at risk for osteoporosis can reduce the risk of fractures associated with falls or other injuries. The most commonly used bone measurement test used to screen for osteoporosis is central DXA; other screening tests include peripheral DXA and quantitative ultrasound (QUS). All the osteoporosis drug therapy studies reviewed by the USPSTF used central DXA to determine eligibility for study enrollment. Peripheral DXA measures BMD at the lower forearm and heel. Quantitative ultrasound also evaluates peripheral sites and has similar accuracy in predicting fracture risk as DXA, while avoiding the risk of radiation exposure; however, it does not measure BMD (June 2018).

For peripheral bone density measurement, there are 3 different types of scans that can be performed to test bone density: photon absorptiometry, peripheral dual energy x-ray absorptiometry, and ultrasound.

Photon absorptiometry uses low doses of radiation but is very slow compared to all other bone density tests using radiation. Although very popular in the past, this method is no longer as commonly used. The radioactive source gradually decays and must be replaced over time. It is also not as accurate as other tests using radiation such as dual energy x-ray absorptiometry (DXA).

A modified version of the DXA scan is called peripheral dual energy x-ray absorptiometry (P-DXA). This uses the x-ray technique of DXA but only measures density in the limbs such as the wrist or the heel. It uses low doses of radiation and is faster than traditional DXA.

Ultrasound uses sound waves to determine bone mineral density (BMD) for heel scan screenings. Ultrasound is rapid and does not use radiation. This technique is generally used as a prescreening tool for bone mineral density. If evidence of bone loss is detected, the patient is generally referred for a more comprehensive scan of the hip and spine using DXA. The most commonly used type of ultrasound for a heel scan is quantitative ultrasound, and there are numerous devices using slightly varying techniques designed for this type of ultrasound. Quantitative ultrasound works by evaluating two measures, broadband ultrasound attenuation (BUA) and speed of sound (SOS). SOS is a measurement of how quickly sound travels through the bone, while BUA is a measure of how much sound is absorbed by the bone.

The advantage of these devices is the ability to bring bone density screening assessments to a large portion of the population who otherwise would not be able to have testing. These machines cost considerably less than those evaluating the hip and spine. However, it is important to note that density changes in the heel and wrist occur much slower than those in the hip or spine. The heel may be normal in bone density even when sites such as the hip or spine are already significantly abnormal. The rate of false negative findings is, however, low enough to support the use of these techniques as a screening procedure.

There are inherent risks in any procedure that involves radiation such as the photon absorptiometry and x-ray, and as such these should be used only after the benefits and risks have been assessed.

EVIDENCE REVIEW

DXA

Bone measurement testing with central DXA is the most commonly used and studied method for the diagnosis of osteoporosis. Central DXA uses radiation to measure BMD at central bone sites (hip and lumbar spine), which is the established standard for diagnosis of osteoporosis and for guiding decisions about treatment. DXA can also be used at peripheral bone sites (such as the lower forearm and heel) to identify persons with low bone mass; however, most treatment guidelines recommend follow-up with central DXA before initiating treatment for osteoporosis. Screening with peripheral DXA and other imaging techniques may help increase access to screening in geographic locations (e.g., rural areas) where machines that perform central DXA may not be available. The USPSTF identified 2 studies (n = 712) that reported on the accuracy of peripheral DXA at the calcaneus to identify osteoporosis; compared with central DXA, the area under the curve (AUC) ranged from 0.67 to 0.80 in women with a mean age of 61 years.

QUS

Quantitative ultrasound is another imaging technique used at peripheral bone sites (most commonly the calcaneus), and it does not require radiation exposure. Compared with central DXA, the AUC for QUS measured at the calcaneus in women ranged from 0.69 to 0.90, with a pooled estimate of 0.77 (95% CI, 0.72-0.81; 7 studies; n = 1,969). In men, the AUC ranged from 0.70 to 0.93, with a pooled estimate of 0.80 (95% CI, 0.67-0.94; 3 studies; n = 5,142). However, QUS does not measure BMD, that is the current diagnostic criteria for osteoporosis. In addition, drug therapy trials for osteoporosis treatment generally use central DXA measurement of BMD as criteria for inclusion of study populations. Thus, before QUS results could be routinely used to initiate treatment without any further DXA measurement, a method for converting or adapting QUS results to the DXA scale needs to be developed. Chou et al. (2014) demonstrated, “in a multiracial referral population heel BMD predicts central osteoporosis and prevalent vertebral fractures equally well in African American as in Caucasian women and may be better than central BMD in assessing fragility in glucocorticoid users.” These studies indicate that

quantitative ultrasound is an effective and safe prescreening tool for bone mineral density that is quick and involves no radiation. Peripheral DXA was found to be a useful measurement of bone density but does involve the use of radiation, and as such should be used with care after the benefits and risks have been considered. Hashimi and Elfandi (2016) aimed to find out whether heel ultrasound is as good as central bone densitometry scanning in diagnosing osteoporosis in patients who are at high risk of osteoporosis. The recruited patients attended for a DEXA scan of the left hip and lumbar spine. All subjects had an ultrasound of the left heel using the quantitative heel ultrasound machine. The results of DEXA scan were blinded from the results of ultrasound and vice versa. The sensitivity and specificity of the ultrasound heel test to predict osteoporosis were 53% (95%CI: 29-77) and 86% (95%CI: 75-96) respectively. Specificity for predicting bone mineral density (BMD)-defined osteoporosis was high (86%), but sensitivity was low (53%). Authors concluded that heel ultrasound result in the osteoporotic range was highly predictive of BMD-defined osteoporosis. A positive ultrasound heel test in high-risk patients is more useful in ruling in osteoporosis than a negative test to rule out osteoporosis.

PRACTITIONER SCOPE AND TRAINING

Practitioners should practice only in the areas in which they are competent based on their education training and experience. Levels of education, experience, and proficiency may vary among individual practitioners. It is ethically and legally incumbent on a practitioner to determine where they have the knowledge and skills necessary to perform such services.

It is best practice for the practitioner to appropriately render services to a patient only if they are trained, equally skilled, and adequately competent to deliver a service compared to others trained to perform the same procedure. If the service would be most competently delivered by another health care practitioner who has more skill and expert training, it would be best practice to refer the patient to the more expert practitioner.

Best practice can be defined as a clinical, scientific, or professional technique, method, or process that is typically evidence-based and consensus driven and is recognized by a majority of professionals in a particular field as more effective at delivering a particular outcome than any other practice (Joint Commission International Accreditation Standards for Hospitals, 2020).

Depending on the practitioner's scope of practice, training, and experience, a member's condition and/or symptoms during examination or the course of treatment may indicate the need for referral to another practitioner or even emergency care. In such cases it is prudent for the practitioner to refer the member for appropriate co-management (e.g., to their primary care physician) or if immediate emergency care is warranted, to contact 911 as appropriate. See the *Managing Medical Emergencies (CPG 159 – S)* clinical practice guideline for information.

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