

Evidence Summary- MS 14 Osteoporosis

Osteoporotic fractures are associated with disability, loss of independence, limitation of ambulation, chronic pain, and decreased quality of life. Approximately 20% of hip fracture patients require long-term nursing care, and 21-30% of patients who experience a hip fracture die within one year.

The primary diagnostic test used to screen for osteoporosis is the central DXA (dual xray absorptiometry) which accurately measures bone mineral density at the hip and lumbar spine. DXA accuracy and reproducibility has led to the established standards for diagnosis of osteoporosis by the World Health Organization. The radiation dose for both lumbar spine and hip scanning in a DXA scan is approximately equivalent to that of a chest xray.

Quantitative CT is regarded as a secondary tool after DXA for screening for osteoporosis. QCT provides a volumetric bone mineral density, as opposed to DXA which is based on a 2-D area measurement. QCT can be performed on most commercially available CT scanners, with the required densitometry analysis software. Quantitative CT is highly accurate in determining tissue density within a region of interest. Indications for QCT are the same as for DXA, however DXA is recommended as the first-line screening and follow-up test for bone density. If DXA is not available, QCT may be used as a secondary technique. Selected conditions in which QCT is considered superior to DXA include extremes in body height, BMI >35, clinical scenarios when an increased sensitivity to small changes in trabecular bone density is required, and in patients with advanced degenerative bony changes in the spine. A potential harm of Quantitative CT is increased radiation exposure (1-10 mSv) as compared to <0.1 mSv for DXA scan.

Radiography has a lower sensitivity for bone loss than DXA. Osteopenia is not a reliable finding on xray until 30-40% of the bone has been lost. There is insufficient evidence to support the use of xray as a screening tool in patients suspected of having low bone mineral density. Patients whose xrays report osteopenia and/or fragility fractures should be referred for DXA for further characterization of bone density.

There is insufficient evidence to support the current use of quantitative ultrasound as a screening tool in patients suspected of having low bone mineral density.

The American College of Radiology Appropriateness Criteria supports DXA as the primary diagnostic choice to screen women >65 years of age and men >70 years of age for osteoporosis, and for postmenopausal women <65 years of age with additional risk factors for fracture.

The National Osteoporosis Foundation recommends bone mineral density testing in all women age 65 and older and all men age 70 and older, and in postmenopausal women younger than 65 years and men aged 50-69 years based on their risk factor profile, including if they had a fracture as an adult.

The USPSTF found convincing evidence that bone measurement tests are accurate for detecting osteoporosis and predicting osteoporotic fractures in women and men, and that drug therapies reduce subsequent fracture rates in postmenopausal women. The USPSTF recommends screening for osteoporosis with bone measurement testing to prevent osteoporotic fractures in women 65 years and older (B recommendation), and in postmenopausal women younger than 65 who are at increased risk of osteoporosis (B recommendation). The USPSTF concluded that current evidence is insufficient to assess the balance of benefits and harms of screening for osteoporosis in men.

One trial (Shepstone et al) evaluated the effect of screening for osteoporosis on anxiety and quality of life and found no difference between screened and unscreened intervention groups. Potential harms of screening for osteoporosis include false negative results, as well as false positive results that can lead to unnecessary treatment, although the USPSTF determined that the potential harms of osteoporosis drug therapies are small.

Central DXA is the “gold standard” for serial assessment of BMD and an important component of osteoporosis management. Biological changes in bone density are small compared to the inherent error in the test itself, and interpretation of serial bone density studies depends on appreciation of the smallest change in BMD that is beyond

the range of error of the test. This least significant change (LSC) varies with the specific instrument used, patient population, measurement site, technologist's skill with patient positioning and test analysis, and the confidence intervals used. QCT of the lumbar spine can also be used for serial assessment of bone mineral density changes in men and women. The National Osteoporosis Foundation recommends repeat bone mineral density assessments one to two years after initiating medical therapy for osteoporosis and every two years thereafter, but recognizes that testing more frequently may be warranted in certain clinical situations, and may be needed less frequently in patients without major risk factors or significant bone density loss on initial BMD testing.

References:

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