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Screening for Osteoporosis

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Hip fractures are among the most devastating consequences of osteoporosis and are associated with substantial loss of independence, along with an increased risk of admission to extended care facilities, morbidity, and mortality.[1]

Related articles pages 2521 and 2532

Age-adjusted incidence of hip fracture in the United States increased among both men and women from 1986-1995 and steadily declined from 1995-2012.[2,3] Hip fracture rates then plateaued at levels higher than projected for years 2013-2015, translating to an estimated 3700 additional hip fractures per year.[3] Efforts are needed to understand this higher plateau rate, but overall declines in bone mineral density (BMD) screening may have contributed.[3]

Thus, the updated Recommendation Statement on osteoporosis screening from the US Preventive Services Task Force (USPSTF)[4] published in this issue of *JAMA* and the accompanying supporting Evidence Report[5,6] are timely. The 2018 USPSTF statement recommends screening for osteoporosis with bone measurement testing to prevent osteoporotic fracture in women 65 years and older (B recommendation),[4] consistent with the 2011 task force recommendations.[7] BMD is a strong and consistent predictor of fracture. A single measure of BMD can predict fracture risk over 25 years, with little degradation in this association over time.[8]

Screening for high-risk patients who may benefit from therapy is important because prevention of fractures in these individuals is possible, given the armamentaria of effective therapies. However, until recently, no studies directly evaluated whether patient outcomes improved after screening. The Screening for Prevention of Fractures in Older Women (SCOOP) randomized trial compared usual management vs screening by the Fracture Risk Assessment Tool (FRAX) and included 12 483 women aged 70 to 85 years.[9] FRAX is an open-access web-based tool that uses clinical risk factors with and without femoral neck BMD to estimate 10-year probability of hip and major osteoporotic (hip, clinical spine, humerus, or wrist) fractures. Women were referred for BMD testing if they had a high probability of major osteoporotic fractures. Treatment was then recommended depending on the BMD results. The results of the SCOOP trial showed that screening did not reduce the incidence of all osteoporotic fractures (the primary outcome) or all clinical fractures but resulted in a 28% reduction in hip fractures, a prespecified secondary outcome (hazard ratio, 0.72 [95% CI, 0.59-0.89]; absolute risk reduction, 0.9%). The SCOOP trial also demonstrated that the approach used was highly cost-effective.[10] Thus, despite the absence of a positive effect on the primary outcome, the results of the SCOOP trial demonstrating a positive effect of screening on hip fractures have important public health implications.

What is different in the 2018 recommendations compared with the 2011 recommendations? In 2011, the USPSTF endorsed FRAX to identify candidates for screening among women aged 50 to 64 years.[7] Specifically, the 2011 guidelines recommended BMD testing for women aged 50 to 64 years whose 10-year predicted risk of major osteoporotic fractures using FRAX was equivalent to that of a 65-year old white woman with no other FRAX risk factors (9.3%).

However, Crandall et al[11] showed that this USPSTF strategy was modestly better than chance alone and inferior to other tools in identifying women aged 50 to 64 years who need BMD testing. Among women with a BMD T score less than −2.5 (osteoporosis), FRAX identified only 33% of these women compared with 74% for the Simple Calculated Osteoporosis Risk Estimation (SCORE) (6 risk factors: age, weight, race, estrogen use, previous fracture, and rheumatoid arthritis) and 79.3% for the Osteoporosis Self-assessment Tool (OST) (0.2 × [weight in kilograms − age in years]).[11] Another study evaluating the USPSTF threshold of 9.3% probability of major osteoporotic fracture reported a sensitivity of 37% and specificity of 74% for the identification of women with a BMD T score in the osteoporotic range.[12] Lowering the FRAX threshold to 5.5% or 6.5% substantially improved sensitivity. In the revised 2018 recommendation, the USPSTF recommends screening women younger than 65 years using a number of formal clinical risk assessment tools including FRAX, SCORE, and the OST.

The USPSTF continues to conclude that the current evidence is insufficient (I statement) to assess the balance of benefits and harms for screening for osteoporosis to prevent osteoporotic fractures in men. Screening is warranted if the burden of disease is great, effective screening tests are available, and efficacious treatments are accessible. BMD screening in older men meets all 3 criteria. Osteoporosis is common among older men: 1 in 5 men 50 years and older will experience an osteoporotic fracture in his lifetime.[13] Mortality after hip fractures is higher among men than among women.[14] Osteoporotic fractures are associated with considerable morbidity and reduced quality of life in men.[15] Screening with dual-energy x-ray absorptiometry (DXA) BMD is an effective means of identifying high-risk individuals: the area under the curve (AUC) for DXA BMD in predicting fractures was similar among men (AUC, 0.64-0.85) and women (AUC, 0.64-0.82).[6] The association between total hip BMD and nonvertebral fractures was stronger for men than for women (P = .01 for interaction).[16] In addition, several therapies are approved by the US Food and Drug Administration for men primarily based on changes in BMD. However, evidence from the Foundation for the National Institutes of Health Bone Quality Study Project showed that hip BMD is a good surrogate of hip fracture outcomes.[17]

Will screening men with DXA reduce fractures? Given limited research funding, it does not seem a good investment to test this in a clinical trial, like the SCOOP trial, when observational data that may address the question are available. For instance, in the Cardiovascular Health Study, use of hip BMD tests to screen for osteoporosis was associated with 36% fewer incident hip fractures over 6 years compared with usual care (absolute risk reduction, 4.1%).[18] There was no evidence that this association differed in men and women.

BMD screening for men should be targeted to men 70 years and older who have a high probability of fracture. In the Osteoporotic Fractures in Men (MrOS) study, Diem et al[19] showed that using the OST score or FRAX reduced the number of men referred for BMD testing. The AUC for an OST score less than 2 for identifying men with a BMD T score of −2.5 or less was 0.68(sensitivity, 0.83; specificity, 0.36). In a microsimulation model, Schousboe et al[20] demonstrated that body weight could be used to select men for whom bone densitometry was cost-effective. Specifically, BMD screening was cost-effective for men aged 55 years and weighing 67 kg, aged 75 years and weighing 101 kg, and aged 80 years and weighing 108 kg. Thus, targeting older men at high risk of fracture for BMD screening is a reasonable approach.

The USPSTF noted limited evidence regarding screening intervals for BMD testing. Of importance, the screening interval depends on both age and the initial BMD result. Among women 67 years and older, the estimated BMD testing interval was 16.8 years for women with normal BMD, compared with 1.1 years for women with an initial BMD T score of −2.0 to −2.5.[21] The screening interval also varied by age. For example, for women with an initial BMD T score of −1.5 to −1.99, the screening interval for 10% to develop osteoporosis was 5.6 years in women aged 67 years but 3.2 years in women aged 85 years. In men, the BMD screening interval also depended on age and BMD. In MrOS, the estimated time for 10% of men to develop osteoporosis was 8.5 years for those with an initial T score of −1.5 to −1.99 and 2.7 years for those with an initial T score of −2.0 to 2.49.[22] Thus, consideration of age and initial BMD will inform the screening interval.

Fracture prevention is the ultimate goal, and BMD screening is an effective, low-cost, noninvasive means of identifying men and women at high risk of fracture. Yet major deficiencies remain in BMD screening, even among women 65 years and older.[8] Assessment of clinical risk factors is also important, because individuals with the combination of low BMD and an increasing number of risk factors have the highest incidence of hip fracture.[23,24] Screening must be followed with effective treatment and fall prevention among those at high risk. Future research should identify ways of improving BMD screening rates and to improve identification of young women (50-64 years) and older men who would benefit from BMD screening.

ARTICLE INFORMATION

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