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# Variability in DXA Reporting and Other Challenges in Osteoporosis Evaluation

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A 65-year-old woman undergoes routine screening dual-energy x-ray absorptiometry (DXA), which reveals T scores of −2.3 at the femoral neck, −2.7 at the Ward triangle, −2.2 at the total hip, and −1.9 at the posteroanterior (PA) lumbar spine. Evaluation reveals no secondary cause of osteoporosis. She asks whether you recommend medication for osteoporosis.

Osteoporotic fractures–hip fractures in particular–are associated with tremendous medical and economic effects. Bone mineral density (BMD) is the best predictor of fracture in the absence of prior fracture, and thus DXA is a crucial tool for identifying patients at high risk. Unfortunately, the quality of DXA reporting is variable, and misleading information may result in inappropriate care. In this issue of *JAMA Internal Medicine*, Fenton and colleagues[1] describe initiation of osteoporosis treatment in women aged 40 to 85 years in their regional health care system. They identified women with densitometric osteoporosis, defined as a T score of −2.5 or less at the total PA lumbar spine or femoral neck. These sites, as well as the total hip, are approved by the International Society for Clinical Densitometry (ISCD)[2] for use in osteoporosis diagnosis in postmenopausal women and men 50 years or older. Fenton et al also identified women with low bone mass (osteopenia) at those main sites and women with osteoporosis-range BMD at non–main sites, such as the Ward triangle and lateral lumbar spine. The investigators present their findings as a barometer for how we are targeting patients for pharmacotherapy.

Fenton et al[1] report that 640 women (73.5%) with PA spine or femoral neck T scores of −2.5 or less received prescriptions for antiosteoporosis medication. This percentage represents a higher incidence of treatment than the approximately 45% to 65% usually reported. Many women probably did not complete the intended course of therapy, given notoriously poor

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persistence and adherence to antiosteoporosis medications. Nevertheless, it is heartening that these health care professionals often initiated treatment for densitometric osteoporosis.

Fenton and colleagues[1] conclude that overtreatment is common. They found that of 1912 women who began receiving antiosteoporosis medication, 1272 (66.5%) had PA spine and femoral neck T scores higher than −2.5, with most of those scores in the low bone mass (osteopenia) range. The authors express concern that these prescriptions were potentially inappropriate. Although the fracture reduction benefit of bisphosphonates in osteoporosis is greater than the risk of adverse events, such as osteonecrosis of the jaw or atypical femoral fracture,[3] these rare complications as well as cost considerations oblige us to avoid treatment in those less likely to benefit. Fenton et al[1] demonstrated that half the prescriptions in women with osteopenia were for the younger individuals (40–64 years) without risk factors as determined by electronic health record review. Even if some of these women had a risk factor for fracture beyond those assessed by the authors (eg, smoking or parental hip fracture), we agree that there was overtreatment of younger women without risk factors.

For women without main-site osteoporosis who were older or had multiple risk factors, it is unclear whether treatment was inappropriate. Some prescriptions in this group presumably represent appropriate treatment for individuals believed to be at sufficiently high fracture risk by their health care professionals (clinical decision-making process discussed below).

Fenton et al[1] suggest that some overtreatment of osteopenia results from health care professionals prescribing antiosteoporosis medications for women with T scores of −2.5 or less at nondiagnostic sites, such as the lateral spine and Ward triangle. Although the ISCD guidelines clearly state which sites should and should not be used for diagnosis, there are no definite recommendations about whether or how to report nondiagnostic site findings. Analysis of DXA findings requires skill and experience to translate computer-generated data into a clinically meaningful evaluation; unfortunately, there is considerable institutional variability. Reasons for this variability may include declining reimbursement for DXA, multiple specialties interpreting the results (eg, radiology, endocrinology, and gynecology), and a lack of clear standards or mandatory certification for the interpretive personnel. Many individuals in the field have expressed concern about DXA quality beyond reporting, including quality control, acquisition, analysis, and interpretation.[4]

Given variable T score reporting and overall interpretation, it is easy to understand how a busy health care professional could be confused by an unclear DXA report and just look for the lowest T score, regardless of the anatomic site, and prescribe treatment based on that score. Based on natural history studies and trials of fracture risk modification with pharmacotherapy, we recommend reporting only T scores at the femoral neck, total hip, and PA lumbar spine; these are the only sites endorsed by the ISCD for diagnosis and by the National Osteoporosis Foundation for treatment decision making,[5] as we describe below. At our Veterans Affairs Medical Center, DXA is performed at the lateral spine to help interpret PA spine results, which can be falsely elevated by osteoarthritis. However, BMD values–not T scores–are reported at the lateral spine, allowing for nuanced assessment when desired but avoiding the potential for overdiagnosis.

For the 65-year-old woman described above, her diagnostic sites do not have T scores of −2.5 or less, and the Ward triangle T score of −2.7 should not be used for diagnosis. Her health care professional reviewed her medical history, determined she was not at high fracture risk, and did not recommend antiosteoporosis pharmacotherapy.

Although BMD is important for osteoporosis assessment, diagnostic evaluation has evolved into a more comprehensive assessment of skeletal fragility. This additional assessment is in recognition of the fact that most fragility fractures occur in individuals with T scores of −1.0 or less but higher than −2.5, because osteopenia is more common than densitometric osteoporosis. The challenge is identifying individuals with osteopenia who have a fracture risk high enough to warrant pharmacotherapy.

To this end, the National Osteoporosis Foundation[5] recommends pharmacotherapy for postmenopausal women and men 50 years or older with osteoporosis-range BMD as per ISCD criteria[2]; a history of hip or spine fracture (and thus demonstrated skeletal fragility); or lowest T score of −1.0 or less but higher than −2.5 plus a 10-year probability of hip fracture of 3% or more or major osteoporotic fracture of 20% or more based on the World Health Organization's Fracture Risk Assessment tool (https://www.shef.ac.uk/FRAX). This tool incorporates femoral neck BMD and several clinical risk factors to estimate absolute fracture risk, although it can also be used without BMD data.

Unfortunately, many high-risk patients are not being evaluated or treated. Prior fragility fracture signals the greatest risk for future fracture, yet only approximately one-fourth of women who develop a fragility fracture undergo DXA or receive an antiosteoporosis medication in the subsequent 6 months.[5] This gap can be addressed by a systematic approach to secondary fracture prevention, such as a fracture liaison service. A fracture liaison service is a coordinator-based program for identifying and managing care for these high-risk patients, with the goal of decreasing recurrent fractures.[5,6] Another tool for identifying high-risk individuals is vertebral fracture assessment, a newer technology that assesses for fractures during DXA via lateral spinal views.[7] Most vertebral fractures are asymptomatic, but even an asymptomatic, nontraumatic vertebral fracture incurs a markedly increased risk of future vertebral and hip fracture. Thus, pharmacotherapy is recommended regardless of BMD.

In conclusion, DXA reporting of T scores at nondiagnostic sites can result in confusion and potentially inappropriate use of antiosteoporosis medications. The T scores determined at the appropriate sites (ie, femoral neck, total hip, and total PA lumbar spine), combined with clinical risk factors (eg, prior fracture), should be used in the evaluation for skeletal fragility and in decision making about lifestyle and pharmacologic interventions.

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