

Challenges in the Screening and Management of Osteoporosis

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Osteoporosis imposes a significant burden of morbidity, mortality, and cost on patients and the health care system. Compliance with existing screening and treatment recommendations is low. There are multiple barriers to treatment including complexity of medical management, cost of medications, real and perceived side effects of medications, and nonadherence.

Osteoporosis is a generalized skeletal disorder characterized by decreased bone density and deterioration of bone quality, which often leads to fragility fractures. Osteoporosis can be diagnosed based on low bone density as measured by dual-energy x-ray absorptiometry (DXA), but low bone density is not required for the diagnosis. A fragility fracture, regardless of DXA results, necessitates the diagnosis of osteoporosis. Low bone mass (osteopenia) is defined as a T-score between -1.0 and -2.49 by DXA. A DXA T-score of -2.5 or lower (determined by lowest calculation from lumbar spine, femoral neck, or total femur T-score) is diagnostic of osteoporosis.

Osteoporosis is a common disease, affecting more than 10 million adults 50 years or older in the United States [1]. An estimate of patients who have low bone mass, which places them at increased risk for fractures, is more than 3 times that number—more than half of the men and women in the United States older than 50 years [1]. Of white women older than 50 years, 4 in 10 will experience an osteoporotic fracture in their lifetime [2]; such fractures frequently result in chronic pain, disfigurement, height loss, impairment in activities of daily living, loss of independence, and lower quality of life. The 1-year mortality rate for patients following a hip fracture is estimated to be 14%–36% [2, 3]. Women with a vertebral fracture have a 1.2-fold greater age-adjusted mortality rate compared with women without fractures [4]. A 2005 estimate calculated the direct cost of fragility fractures to be \$19 billion annually [5].

Screening for Osteoporosis

Osteoporosis is a silent disease. The first symptom of osteoporosis is either pain related to a fracture or height loss related to vertebral compression fractures. The prevalence of the disease, lack of early symptoms, and availability of effective treatments make screening for osteoporosis

critical to the management of this disease [6]. In 2011, the US Preventive Services Task Force (USPSTF) recommended osteoporosis screening for women aged 65 years or older and for women over 50 years whose fracture risk is equal to or greater than that of a 65-year-old white woman who has no additional risk factors [7].

The FRAX risk assessment tool can be used to identify postmenopausal women younger than 65 years who would benefit from bone mineral density (BMD) testing [8]. The FRAX tool uses updated, evidence-based estimates of absolute fracture risk and was created to quantitatively integrate multiple factors into a clinically useful risk prediction model. The FRAX tool should be used following BMD testing to identify patients with osteopenia who would benefit from pharmacologic therapy. Based on the FRAX tool, a 65-year-old woman with no other risk factors for osteoporosis has a 10-year risk for any osteoporotic fracture of 9.3%. A risk greater than this in a woman younger than 65 years is an indication to screen for osteoporosis. Risk factors that should prompt risk stratification in women younger than 65 years include current smoking, daily alcohol use of 3 or more drinks per day, body mass index less than 21 kg/m^2 , history of parental fracture, rheumatoid arthritis, and steroid use for a duration of over 3 months.

Despite clearly established benefits of treatment, screening rates remain low [6]; one study reported that only 27% of eligible women aged 66–70 years received DXA screening [9]. Screening rates for men are much lower in part because screening recommendations for this population are less clear. The USPSTF gives an “I” recommendation for screening men, meaning that current evidence is insufficient to recommend for or against screening [7], while the National Osteoporosis Foundation (NOF) recommends screening all men over age 70 years as well as some men above age 50 years, based on their risk factor profiles [10]. Screening for men is further complicated by the lack of Medicare reimbursement for routine osteoporosis screening in men.

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Management of Osteoporosis

There are several challenges associated with the management of osteoporosis and the prevention of fractures. Because of the prevalence of this disease and patients' limited access to specialty care, primary care physicians must be familiar with management options for osteoporosis. Primary care settings are well suited for offering systematic screening for osteoporosis, providing efficient and cost effective treatment, and coordinating care transitions from the hospital after a fragility fracture. However, determining who needs treatment and for how long is an increasingly complicated decision. Barriers to patient engagement include a lack of understanding of the disease, skepticism about treating a silent disease to prevent a possible future outcome, concerns about reported side effects of medications, and the cost of available treatments. These challenges lead to high rates of patient refusal of treatment and non-adherence with prescribed medications.

Another challenge is the difficulty of interpreting the DXA result and recommending a course of treatment. The NOF recommends that postmenopausal women and men over 50 years should be counseled on their risk of osteoporosis and related fractures, evaluated for secondary causes, advised on dietary intake of calcium and vitamin D, advised to participate in regular weight-bearing and muscle strengthening exercise, assessed for falls risk, and counseled on tobacco cessation and moderate use of alcohol [10, 11]. This counseling, particularly for falls assessment, is time consuming and detailed.

Pharmacologic treatment is recommended if the patient is diagnosed with osteoporosis based on a low T-score or the presence of a fragility fracture. Based on cost-effectiveness analyses, pharmacotherapy is also recommended for the treatment of osteopenia when the patient has a 10-year hip fracture probability of 3% or higher, or if he or she has a major osteoporosis-related fracture probability of 20% or higher based on the FRAX tool [2, 9, 10].

The oral bisphosphonate drug alendronate has the strongest supporting evidence for the prevention of hip, vertebral, and non-vertebral fractures [12]. While many patients are good candidates for oral bisphosphonates, consideration must be given to the patient's renal function and serum calcium levels, and the patient must be able to swallow, follow complex directions, and adhere to an intermittent medication regimen. Regularly discontinuing bisphosphonate for brief periods ("drug holidays") has been studied in lower-risk patients and can be used to minimize overall medication burden, decrease cost, and minimize side effects that are associated with length of therapy [13]. However, not all patients treated with bisphosphonates are candidates for drug holidays. If a patient has a high risk for vertebral fracture, a drug holiday may be inadvisable. Also, any temporary discontinuation of therapy introduces risk of failure to follow-up. Patients should continue with calcium, vitamin D,

and nonpharmacologic treatment during a bisphosphonate holiday.

For patients who are not candidates for oral bisphosphonates—based on their inability to swallow, sit upright, or follow the regimen—additional treatment options include intravenous bisphosphonates, rank ligand inhibitors (denosumab), or teriparatide. However, these therapies are more expensive than oral bisphosphonates and require additional office visits to administer the drug (denosumab and intravenous bisphosphonates) or to teach patients appropriate self-injection technique (teriparatide). Prior authorization is often required, and not all insurance companies cover second-line agents. These logistical challenges might be difficult for the primary care physician to manage efficiently without team members such as nurses, care coordinators, and pharmacists.

Patients are less likely to perceive osteoporosis as a significant cause of morbidity and mortality compared to other chronic diseases. Clinicians must therefore educate patients about the risks of fractures and their sequelae before a meaningful and balanced discussion of treatment options can be undertaken. Even after such a discussion, patients often make the choice to "wait and see," to treat with diet and exercise alone, and/or to refuse medications. Overall, adherence and persistence with bisphosphonates are low, increasing the cost of health care due to preventable fractures [14-16].

In our experience, many patients believe that they can manage osteoporosis with diet and exercise alone, and dissuading them from this approach may be difficult. Older patients may already have a significant medication burden and may exhibit a healthy skepticism about adding another medication. They may thus miss an opportunity to utilize a therapy that decreases their risk of fracture and improves their quality of life. In our practice, identifying and framing the conversation around common goals of maintaining quality of life and preserving independence carries greater weight with patients than does quoting fracture and mortality rates.

The available medications for the treatment of osteoporosis have strong therapeutic value. In women at a high risk for fracture, the number needed to treat (NNT) with alendronate is 22 to prevent a hip fracture and 20 to prevent a vertebral fracture [17, 18]. However, rare side effects of bisphosphonates have received significant media exposure, leading to significant fears among patients. The estimated incidence of osteonecrosis of the jaw in patients taking oral bisphosphonates is 0.7 per 100,000 patient-years [19], and the risk of atypical femoral shaft fractures is 0.13% in the subsequent year for women with at least 5 years of treatment [20]. It is a time-intensive task to present patients with a balanced picture of the risks associated with the medications compared to the often unspoken and greater risk of doing nothing.

Medication costs can also present a significant burden. Oral bisphosphonates are not cost prohibitive and are avail-

able generically. However, patients who cannot take oral bisphosphonates must consider a group of expensive alternatives that may place them in the Medicare Part D donut hole, in which case they must pay out of pocket. In some cases, these drugs may also require a cumbersome prior authorization process.

There are also several nonpharmacologic interventions for patients with osteoporosis that should be pursued aggressively: smoking cessation, weight-bearing exercise, Tai Chi, and moderation of alcohol consumption [10, 11]. Attention should also be given to maintaining adequate calcium and vitamin D levels and discontinuing medications that increase risk for falls. The NOF recommends 1,200 mg per day of calcium from all sources (supplements, vitamins, and diet) for optimal bone health [11], and the American Geriatrics Society recommends 4,000 IU of vitamin D in patients older than 65 years to decrease the risk of falls [21]. Published by the American Geriatrics Society in 2015, the Beers Criteria for potentially inappropriate medication use in older adults is an important resource that identifies medications that increase the risk of falls [22].

Population Management

Systematic population management is needed to adequately screen for and treat osteoporosis. This need is especially apparent in the management of patients following a fracture. Patients who have already had a fracture are at extremely high risk of repeat fracture, and rates of follow-up care are reported to be only 1%–25% [1, 8, 14]. Fewer than 25% of women receive a DXA scan or a prescription for bisphosphonate after a fragility fracture [23, 24]. The post-fracture population can be lost to primary care follow-up because patients often receive care for their fracture in the hospital, in a specialist's office, or in a long-term care facility.

A fracture liaison service (FLS) is a new model of care transitions for patients with recent fractures. An FLS coordinates care to ensure that patients receive optimal medical care after a fracture; use of this model has been shown to improve the quality of care delivered [11, 23] and to reduce subsequent fractures, with an NNT of 20 [24]. In order to be successful, an FLS requires local hospital and physician champions, often in many specialties, to coordinate their efforts. The NOF offers training programs for institutions wishing to develop an FLS.

Conclusion

Osteoporosis management is challenging. As our population ages, the prevalence of this disease is predicted to grow 50% by 2025, which would translate into 3 million fractures annually and \$25.3 billion each year in direct and indirect costs [5]. The scope of the disease necessitates sophisticated understanding of screening and treatment guidelines and equally sophisticated population management to deliver coordinated services. Effective education of the public is also needed to communicate the benefits of treatment and

the risks of forgoing treatment. Improved screening for and treatment of osteoporosis in North Carolina is an important goal that will require attention to all of these factors. *NCMJ*

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