

Osteoporosis Screening as a Model for Effective Preventive Healthcare in Concierge Medicine

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Abstract

Background : Annually, 2 million osteoporosis-related fractures result in 400,000 deaths and cost \$12-17 billion in the United States. We examined the rate of bone density screening in our concierge medicine practice and compared this with previously published data for other patient populations.

Methods : Using our electronic medical record system, we conducted a retrospective review of all patients followed in our group practice to determine the proportion of eligible patients who have been screened for osteoporosis. We present these results along with data for comparator populations.

Results : In our population of 112 women age 50 or greater, 106 (94.6%) had been screened and of 63 women age 65 or greater, 61 (96.8%) had been screened. Our screening rate in Medicare age women (96.8%) compares favorably with previously published screening rates for Medicare HMO, Medicare PPO and MDVIP patients (74.2, 78.5 and 90.3% respectively).

Conclusions : These data support our notion that limiting patient population size and effectively using a comprehensive electronic medical record in a systematic approach to prevention results in higher rates of osteoporosis screening.

Background

Physicians at the Center for Executive Medicine (CEM) screen for osteoporosis in all women starting at age 65 and in estrogen deficient women starting at age 50. We take a focused and systematic approach to screening and this proactivity helps us prevent many long-term complications and diseases, including osteoporosis.

Member patients can communicate with their physician or our office staff 24 hours per day and are routinely seen on the same day they call for office visits. This level of communication and interaction facilitate the development of an extremely effective relationship between patient and physician.

Osteoporosis is the most common metabolic bone disease worldwide, affecting over 200 million people. In the United States, 9.9 million are affected, resulting in 2 million bone fractures, 432,000 hospital admission, 180,000 nursing home admissions, and 2.5 million medical office visits each year [1]. An estimated 15.8% of non-Hispanic white and Asian women over the age of 50 have osteoporosis while 20.4% of Hispanic women over the age of 50 are estimated to have osteoporosis [2].

Annual healthcare costs were estimated in 2011 to range from \$12-18 billion for treating osteoporotic fractures alone [3]. The 3 million annual fractures predicted by 2025 will result in annual expenditures of \$25 billion [4].

The weakened state of bone in osteoporosis typically leads to vertebral compression fractures or femoral neck hip fractures; such debilitating injuries prevent many patients from being able to live independently. This altered lifestyle has physical, psychosocial, and economic consequences for the patient, their family and society. In the year following a hip fracture, one in five patients die [5] and about one in three are admitted to a nursing facility [6].

Screening allows early identification of those at risk for fracture and implementation of preventive strategies. Interventions include weight-bearing exercise [7], vitamin D and calcium [8], smoking cessation and moderation of alcohol consumption [9]. Anti-resorptive agents such as bisphosphonates aid bone remodeling and decrease bone resorption. One study from the United Kingdom suggests that pharmacological treatment with alendronate in women with low BMD or risk factors for bone fractures is cost-effective for primary and secondary prevention of osteoporosis [10].

While screening recommendations vary (see Table 1), there is consensus in screening all women over the age of 65 due to natural drops in estrogen levels. Screening for osteoporosis in men is generally recommended beginning in the 8th decade, unless risk factors for bone fractures are present.

Fractures risk factors include advancing age, postmenopausal state, systemic glucocorticoid treatment, history of fractures, family history of fractures, low body weight, smoking, greater than moderate alcohol consumption, secondary osteoporosis, and rheumatoid arthritis [11]. One fracture risk algorithm (FRAX) developed by the World Health Organization (WHO) uses these risk factors to estimate the 10-year probability of an osteoporotic fracture in each patient [12].

The most common osteoporosis screening method is measurement of bone mineral density (BMD) at the femoral neck of the hip and vertebra using dual-energy x-ray absorptiometry (DXA). BMD measurements provide a T-score and Z-score, comparing BMD of the given patient to subjects at peak BMD and to gender and age-matched controls respectively. Resultant T-scores greater than -1.0 (more than one standard deviation below the mean)

are considered normal. Osteopenia is defined as a T-score between -1.0 and -2.5 and osteoporosis is defined as a T-score less than or equal to negative 2.5.

Methods

To assemble the data herein, we queried our electronic medical record (Centricity Practice Solution, General Electric Healthcare) to determine bone density screening rates for women age 50 and over as well as 65 and over.

We then compared the screening rates for osteoporosis between CEM members, MDVIP [13] members (a large concierge medicine group practice), and Medicare HMO and PPO members [14].

Results

The CEM population included 112 women age 50 or greater, of whom 106 (94.6%) had been screened and 63 women age 65 or greater, of whom 61 (96.8%) had been screened.

Table 2 shows comparative screening rates for osteoporosis among eligible populations separated by their current healthcare plans. CEM members receive screening for osteoporosis at a raw percentage greater than patients in the other health care plans listed. Lacking comparator population size, we cannot assess the statistical significance of these differences.

Discussion

Discussion

The Center for Executive Medicine is an internal medicine and family medicine group practice in metropolitan Dallas, Texas consisting of three physicians. Most of our patients pay an annual membership fee to receive around-the-clock access to our physicians and staff. We additionally maintain a significant population of “scholarship” patients who do not pay the annual membership fee. There is no difference in the level of access or care provided for scholarship patients.

We use a comprehensive electronic medical record; the screening process for osteoporosis begins with dedicated EMR review for every patient in our practice on a regular (generally not less than quarterly) basis, even absent an interval office visit. EMR programming flags any patient at risk for developing osteoporosis, meaning all women over the age of 50 are flagged in the system for BMD testing. All patients are flagged by EMR or the physician for vitamin D deficiency, chronic steroid use, chronic warfarin use, or multiple fractures as an adult. Flags in the system prompt communication from CEM staff with the patient for further discussion on the importance of screening. Communication from physicians and staff further improves patient adherence to screening recommendations.

Most patients agree to DEXA screening when that recommendation is relayed by practice nursing staff. The programmatic nature of the process prompts our staff to act on agreed screening protocols, such as that for DEXA screening in all women over 65 and younger women when appropriate. Physicians then can intervene with patients not screened following an initial recommendation to do so. When a patient agrees to DEXA screening, based on either the recommendation communicated via the nursing staff or direct interaction with the physician, a chart note is generated, and our staff coordinates procedure scheduling.

Our staff place future reminders to verify that the screening was completed and reviewed by the physician in a timely manner. After the DXA report has been reviewed by the physician, entering the T-score into the EMR and communicating results to the patient satisfies the reminder flag in the EMR. When possible, subsequent BMD measurements are scheduled with the same imaging unit to facilitate consistent readings for trends in BMD. The interval for subsequent re-measurement is determined by the physician based on the current reading, risk factors, patient preference, whether treatment is undertaken.

We have achieved a rate of osteoporosis screening higher than those provided to patients in other settings. We believe that our systematic approach to screening based on agreed protocols, which are then automated using

the electronic medical record system results in superior screening rates. Others have not found a consistent association between EMR use and screening, and some have found that primary care visits where EMR is used resulted in *fewer* preventive services provided to eligible patients [15].

Beyond the effective use of our EMR system, we believe that our focus on prevention increases screening rates. Most primary care physicians are tasked with the management of 2,000 - 5,000 patients. MDVIP practices establish a goal of 600 patients per physician. Each CEM physician manages between 100 and 200 patients. Limiting patient population size allows our physicians to expand their time and efforts preparing for each patient, improving patient education on the long-term benefits of screening for diseases like osteoporosis, communicating test results and explaining the rationale for interventions.

Approximately 20% of our patients receive care under "scholarship" status, where the annual membership fee has been waived. Fee-waived members receive the same enhanced physician access and same medical care as other members. We considered whether patient socioeconomic status might affect screening rates achieved. In women in both groups (age 50 or greater and age 65 or greater), the screening rate for "scholarship" patients was at least as high as that for the membership overall (95.4% in the age 50 or greater group and 100% in the age 65 or greater group). We have previously found a similar lack of difference in care in scholarship members in colon cancer screening rates [16]. Further, the MDVIP comparator patient population are also enrolled in membership-fee based concierge medicine practices.

In 2016 approximately 31% of Medicare beneficiaries were enrolled in a Medicare Advantage plan, of those approximately two-thirds were enrolled in HMO Plans. Medicare PPO members are provided with more flexibility to see physicians outside of the plan's provider network, albeit potentially at increased cost. PPO member osteoporosis screening rates were higher than HMO, but this association has not been seen consistently in other care measures [17].

While direct data is not available at present, it may be that the size of patient population per physician or number of patients seen per day may be inversely related to completion of osteoporosis screening. This might explain the graded increase in screening rate from Medicare HMO to PPO, to MDVIP, to CEM with each population potentially receiving more focused attention than the prior.

Conclusion

Data analyzed in this retrospective chart review support our notion that limiting patient population size and effectively using a comprehensive electronic medical record in a systematic approach to prevention results in higher rates of osteoporosis screening.

Declarations

- Ethics approval and consent to participate

No protected health information is presented in this manuscript, ethics committee review was not sought.

- Consent for publication

Not applicable.

- Availability of data and materials

The datasets used and/or analyzed in preparation of this manuscript are available from the corresponding author on request.

- Competing interests

The authors report no competing interests.

- Funding

No external funding was sought or utilized in preparation of this manuscript.

- Authors' contributions

CW extracted and compiled electronic data files used in calculation of screening rates and was the original author of a substantial portion of the manuscript text. SY specified the original intent of the investigation, directed the course of the inquiry, performed the analysis of the aggregated data and was the original author of a substantial portion of the manuscript text. MS was the original author of portions of the manuscript, reviewed referenced sources for applicability and provided substantial input in the draft revision process. Each author has read and approved the final manuscript.

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Not applicable.

Tables

Table 1. Osteoporosis Screening Recommendations

American Association of Clinical Endocrinologists recommends screening all women over the age of 65 in addition to all postmenopausal women with history of low-impact fractures, radiographically identified osteopenia, glucocorticoid therapy, or risk of secondary osteoporosis [18].

The National Osteoporosis Foundation (NOF) recommends BMD testing in all women over the age of 65 and men over the age of 70. Further recommendations for BMD testing include postmenopausal women over the age

of 50 and adults with a history of fracture after the age of 50. An history of rheumatoid arthritis or medications associated with lowering bone mass call for BMD testing [19].

The United States Preventive Services Task Force (USPSTF) similarly recommends BMD screening in all women over the age of 65. They specify the need for BMD measurements in younger women with calculated equal fracture risk compared to 65-year-old women with no history of osteoporosis [20]. American Academy of Family Physicians (AAFP) endorses the USPSTF screening criteria [21].

Table 2. Osteoporosis Screening Rates

	DXA screening rate
CEM	96.8%
MDVIP	90.3%
Medicare HMO	72.7%
Medicare PPO	80.5%

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