

Physician Characteristics Associated with the Use of Bone Densitometry

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To determine physician characteristics associated with the use of bone densitometry (BD), we conducted a cross-sectional survey of primary care practitioners in an urban community hospital. Participants were internists, geriatricians, and family practitioners. Seventy-two percent of the physicians never used BD. There was no association between physician or practice characteristics and BD use. Bone densitometry users were more likely than nonusers to treat their patients with osteoporosis or at risk of developing it. Self-reported barriers to use included cost, unfamiliarity with guidelines, uncertainty with clinical applicability, minimal impact on treatment decisions, and availability. In conclusion, although it has been shown that osteoporotic women who are aware of their BD results are more likely to accept treatment, further attention should be paid to primary care practitioners' attitudes, knowledge, and behavior regarding the use of BD in the management of osteoporosis.

KEY WORDS: bone densitometry; osteoporosis; physician knowledge; attitudes; behaviors.

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Osteoporosis is believed to result in at least 1.3 million fractures in the United States each year.¹ These fractures result in significant morbidity and mortality in the fastest growing segment of our population, the elderly. Because of this, osteoporosis is a significant health concern that may eventually cost the United States between \$4 billion and \$60 billion a year.^{2,3}

Efforts aimed at maintaining bone mass are considered crucial in decreasing the risk of fractures.³⁻⁶ Several studies have shown that for 1 SD decrement in bone mass, fracture risk increases as much as 50% to 100%.⁴ Recently, the efficacy of the bisphosphonate alendronate was demonstrated by documenting a 48% reduction in vertebral fracture rates in conjunction with a 9% increase in bone density.⁷ The Postmenopausal Estrogen/Progestin Interventions (PEPI) Trial also demonstrated as much as a 5% increase in bone mineral density with hormone replacement therapy.⁸ Bone mass can now be measured in a safe, reliable and accurate manner using bone densi-

tometry (BD), especially with the development of dual-energy x-ray absorptiometry (DEXA).⁹

Bone densitometry may have an expanded role in the management of patients with osteoporosis, especially given the multiple options for treatment.¹⁰⁻¹² Because screening all perimenopausal women is costly, several experts have published selective screening practice guidelines for women at high risk of osteoporosis: women with estrogen deficiency considering replacement therapy, patients with radiographic abnormalities suggesting osteoporosis, patients on long-term glucocorticoid or anticonvulsant therapy, and patients with primary hyperparathyroidism.^{9,13-18} However, there is no evidence linking BD use with reduced fracture incidence.

Rubin and Cummings reported that women's knowledge of their BD results influenced their decision to accept therapy for osteoporosis.¹⁹ It has not previously been reported whether the physician's knowledge of patients' BD results influences treatment recommendations.

Given the uncertain utility of BD in the clinical setting, we sought to characterize the use of BD by primary care practitioners (PCPs) affiliated with a community hospital.

METHODS

In January 1994, a questionnaire was mailed to all active attending physicians in internal medicine and family medicine with admitting privileges at St. Mary's Hospital, a 250-bed urban community teaching hospital affiliated with the University of Rochester School of Medicine and Dentistry. These physicians provide care to a population of patients with diverse socioeconomic backgrounds, and practice in private, hospital-sponsored, and hospital-based settings. The questionnaire addressed PCPs' practice characteristics, their knowledge and attitudes regarding the diagnosis and treatment of osteoporosis, and their use of BD.

All categorical variables were analyzed with the χ^2 or Fisher's Exact Test where appropriate. The primary dependent variable was BD use (ordered at least once a year versus nonuse (never ordered)). Ordering a BD at least once a year implied use of the test at least once within a year for any patient, not annual use for an individual patient.

RESULTS

Demographics

The response rate was 75% (62/81). The PCPs were internists (47.5%), family practitioners (47.5%), or geriatricians (5%). The majority of physicians were male (62%),

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older than 40 years (52.4%), in practice for less than 10 years (57.4%), and had a practice of more than 750 patients (63.2%). The majority of their patients were white (70% of the physicians reported >50% of their patients were white) and female (72.2% of the physicians reported >50% of their patients were female). Twenty-two percent of the physicians identified more than half of their female patients as perimenopausal or postmenopausal. Only 10% of the physicians perceived that the prevalence of osteoporosis was greater than 50% in their practices; 60% of the physicians reported that less than half of their female patients were at risk of osteoporosis. Among their patients, physicians identified white postmenopausal women as the group at greatest risk of osteoporosis.

Knowledge and Treatment

Of the respondents, 68% and 71% felt comfortable with their knowledge regarding the diagnosis of osteoporosis and treatment of osteoporosis, respectively. However, few physicians (5.2%) reported treating all patients with osteoporosis or at risk of developing it. When these physicians do treat patients at risk, they use calcium (85.5%) or estrogen replacement therapy (90.9%) or both.

Bone Densitometry Use

Bone densitometry was never used by 72% of physicians. Only 5% of physicians used it more than 5 times per year. The physician-identified barriers to ordering BD included potential cost to the patient (50%), unfamiliarity with BD guidelines (41%), uncertainty with the clinical applicability of results (52%), minimal impact on treatment decisions (21%), availability of BD (21%), and other factors (7%).

Univariate comparisons (Table 1) revealed no association between BD use and physician characteristics or physician's comfort with the diagnosis and treatment of osteoporosis. There was no association between physician-reported barriers to BD use and reported BD use. When evaluating physicians' treatment practices, we found 70% of BD users versus 30% of BD nonusers treat more than 50% of their patients with osteoporosis or at risk of developing it ($p = .005$). Bone densitometry users' medical practices were not more likely to have increased numbers of female, perimenopausal or postmenopausal white women, or patients perceived to be at risk of osteoporosis.

DISCUSSION

Despite the evidence supporting a role for BD in primary care, we found the majority of the physicians simply did not use it. The physicians cited several practical reasons for not using BD. Fifty percent of them cited cost as a reason for not using the test. Although third-party payers are in the process of creating expanded criteria for payment, there is concern that patients may incur some (or all) of the cost until those criteria are implemented.

It is not surprising that 52% of these physicians do not order the test because they are uncertain of the utility of the information obtained. This may mean that physicians need more evidence for the effectiveness, rather than efficacy, of BD. There is no direct evidence that BD use results in reduced fracture rates. However, indirect evidence suggests that outcomes are improved by treating patients with low bone density.^{7,8} In addition, 41% of these physicians do not use BD more often because they are not familiar with published guidelines, suggesting that physicians need more education regarding the use of

Table 1. Univariate Correlations of Bone Densitometry (BD) Use

	BD User,* % (n)	BD Nonuser,† % (n)	p Value‡
Physician characteristics			
Internal medicine or geriatrics	59 (10/17)	50 (22/44)	NS
Age <40 years	47 (8/17)	48 (21/44)	NS
>10 years in practice	47 (8/17)	41 (18/44)	NS
Female physician	41 (7/17)	36 (16/44)	NS
>750 patients in practice	64 (9/14)	63 (27/43)	NS
Treat >50% of patients with or at risk of osteoporosis	69 (11/16)	29 (12/42)	.005
Factors that limit use of BD (not exclusive)			
Uncertain of utility	40 (6/15)	56 (24/43)	NS
Concern about cost	53 (8/15)	49 (21/43)	NS
Unsure of guidelines	40 (6/15)	56 (24/43)	NS
Empiric treatment of all patients at risk	27 (4/15)	19 (8/43)	NS
Limited availability	20 (3/15)	21 (9/43)	NS

*A BD user orders BD at least once per year.

†A BD nonuser never orders BD.

‡NS = $p > .05$.

BD. Twenty-one percent of the physicians indicated that they would treat patients empirically, implying that BD results would have a minimum impact on treatment decisions.

Ironically, none of the above barriers to BD use was associated with self-reported BD use. The only association we found was that physicians who treat the majority of their at-risk patients for osteoporosis are also more likely to use BD. This association would be explained if the physicians treating patients were simply more knowledgeable about osteoporosis and therefore more likely to diagnose and treat the condition. However, no significant differences in physicians' self-perceived knowledge about diagnosis and treatment was found when comparing BD users versus nonusers. It is possible that the practice populations differed. Physicians who treat more women, or more white postmenopausal women, may have greater experience in management of osteoporosis; however, we found no significant association between physician characteristics or their patients' characteristics and BD use.

Limitations of this study must be acknowledged. We did not inquire about the patients' comorbidities and their influence on the diagnosis and treatment of osteoporosis. We relied entirely on physician self-report (the physician's actual behavior could not be confirmed), which may reflect attitudes about practice rather than true practice. In addition, this study was performed at a single institution, and the generalizability of these results and our power to detect other statistically significant results may therefore be limited. For these reasons, we hope our results stimulate further research about the use of BD in other practice settings.

The fact that physicians who use BD are more likely to treat osteoporosis may mean disease verification plays a pivotal role in a physician's acceptance of treatment risks and side effects before offering it to the patient. Knowledge of BD results has not been previously reported to change physicians' behavior with respect to treatment of osteoporosis. Patients who are aware of their low bone mass (as documented by BD) are more likely to accept treatment and alter their lifestyle.¹⁹ The potential for BD to facilitate educated decisions between physicians and their patients with regard to treatment of osteoporosis could have a significant effect on this major public health concern.

REFERENCES

1. Peck WA. National Institute of Health Consensus Conference: Osteoporosis. *JAMA*. 1984;252:799-802.
2. Baron JA, Barrett J, Berger M. Incidence and costs to medicare of fractures among medicare beneficiaries aged >65 years—US July 1991–June 1992. *MMWR*. 1996;45:877-8.
3. Melton JL, Eddy DM, Johnston CC. Screening for osteoporosis. *Ann Intern Med*. 1990;112:516-28.
4. Johnston CC, Slemenda CW. Risk assessment: theoretical considerations. The consensus development conference on osteoporosis. *Am J Med*. 1993;95 S5A:2-5S.
5. Wasnich R. Bone mass measurement: prediction of risk. The consensus development conference on osteoporosis. *Am J Med*. 1993;95 S5A:7-10S.
6. WHO Study Group. Assessment of fracture risk and its application to screening for post-osteoporosis. WHO Tech Rep Theories. 1994:843.
7. Liberman VA, Weiss SR, Broll J, et al. Effect of oral alendronate on bone mineral density and the incidence of fracture in postmenopausal osteoporosis. *N Engl J Med*. 1995;333:1437-43.
8. Bush TL, Wells HB, James MK, et al. Effects of hormone therapy on bone mineral density: results from the PEPI trial. *JAMA*. 1996;276:1389-96.
9. Wahner H. Panel session: bone mass, bone mass measurement, technical aspects and clinical interpretation of bone mineral measurements. *Public Health Rep*. 1989;104S:27-30.
10. Tosteson ANA, Rosenthal DI, Melton J, Weinstein MC. Cost effectiveness of screening peri-menopausal women for osteoporosis: bone densitometry and hormone replacement therapy. *Ann Intern Med*. 1990;113:594-602.
11. Cummings SR, Browner WS, Grady D, Ettinger B. Should prescription of postmenopausal hormone therapy be based on the results of bone densitometry? *Ann Intern Med*. 1990;113:565-7.
12. New drugs for osteoporosis. *Med Lett*. 1996;38:1-3.
13. Riggs BL, Wahner HW. Bone densitometry in clinical decision making in osteoporosis. *Ann Intern Med*. 1988;108:293-5.
14. National Osteoporosis Foundation, Scientific Advisory Board Report. Clinical Indications for Bone Mass Measurements. Washington, DC: National Osteoporosis Foundation, submitted to the Health Care Financing Administration; 1989:1-28.
15. Mazess RB, Barden HS. Bone densitometry for diagnosis and monitoring osteoporosis. *Proc Soc Exp Biol Med*. 1989;191:261-71.
16. Johnston CC, Slemenda CW, Melton LJ. Clinical use of bone densitometry. *N Engl J Med*. 1991;324:1105-9.
17. Genant HK, Block JE, Steiger P, et al. Appropriate use of bone densitometry. *J Radiol*. 1989;170:817-22.
18. U.S. Preventive Services Task Force. Screening for postmenopausal osteoporosis. In: *Guide to Clinical Preventive Services: An Assessment of the Effectiveness of 169 Interventions*. Baltimore, Md: Williams & Wilkins; 1989:239-43.
19. Rubin SM, Cummings SR. Results of bone densitometry affects womens' decisions about taking measures to prevent fractures. *Ann Intern Med*. 1992;116:990-5.