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Knowledge and Opinions of Orthopaedic Surgeons Concerning Medical Evaluation and Treatment of Patients with Osteoporotic Fracture

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KNOWLEDGE AND OPINIONS OF ORTHOPAEDIC SURGEONS CONCERNING MEDICAL EVALUATION AND TREATMENT OF PATIENTS WITH OSTEOPOROTIC FRACTURE

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Background: With the exponential increase in osteoporotic fractures, orthopaedic surgeons are in a logical position to become more involved in the medical treatment of this disease. However, it has been hypothesized that surgeons may not be inclined to initiate such treatment if they do not view medical interventions as an extension of their surgical opportunities. The objective of this study was to determine the knowledge and opinions of orthopaedic surgeons with regard to their opportunities for initiating medical treatment of patients with an osteoporotic fracture.

Methods: A survey consisting of twenty-two questions was administered to 171 orthopaedic surgeons in Utah, Idaho, and Wyoming.

Results: Of the 171 surveys that were mailed, 107 usable surveys were returned (a 63% response rate). A majority of the orthopaedic surgeons thought that it was appropriate to expand their orthopaedic practice to include prescribing pharmacological treatments for osteoporosis (68% agreed or strongly agreed with that statement). However, 47% were concerned enough about adverse events related to some conventional pharmacological treatments that they would rather avoid prescribing them. Of the surgeons who were willing to prescribe these treatments, 74% felt most comfortable prescribing bisphosphonates and >77% felt most comfortable prescribing calcium and vitamin-D supplements. Fifty-one percent considered an apparent osteoporotic fracture and several other clinical risk factors for osteoporosis as sufficient evidence for initiating pharmacological treatments, whereas 72% thought that a bone-density scan should be made before initiating treatment. Although 32% thought that all nonoperative treatment should be the responsibility of a primary care provider, 63% thought that the orthopaedic surgeon should initiate a workup to look for secondary causes of the osteoporosis and should begin medical treatment of patients with an osteoporotic fracture before referring them.

Conclusions: Although a majority of orthopaedic surgeons believe that they should expand their role in the medical treatment of patients with an osteoporotic fracture, many do not institute medical treatment and think that the patient's primary care providers should be responsible for medical care.

The number of patients with osteoporotic fractures who are treated by orthopaedic surgeons is increasing at an exponential rate¹⁻³. With fracture rates rising so rapidly, it is projected that, worldwide, hip fractures will reach epidemic proportions, exceeding six million by the year 2050⁴. In view of

this critical health issue, it is necessary to question how we, as orthopaedic surgeons, can ensure appropriate medical workup and treatment of patients with these fragility fractures.

There are data showing that a low-energy fracture in an adult in late middle age or older can be a good predictor of a subsequent low-energy fracture^{5,6}. Also, in an adult, a distal radial fracture resulting from low-energy trauma is often the sentinel event that heralds the onset of osteoporosis⁷. In many cases, a fracture may be a more powerful indicator than a low



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bone-mineral density demonstrated by an axial dual-energy x-ray absorptiometry (DEXA) scan⁸. For example, in one study⁹, a preexisting osteoporotic vertebral fracture increased the risk ratio for another fracture to approximately 4.1 to 5.3. A recent meta-analysis of the relationship between a previous fracture and the risk of a subsequent fracture in adults (44,902 women and 15,259 men in eleven cohorts) revealed that: (1) a previous fracture is associated with a significantly increased risk of any fracture compared with the risk in individuals without a prior fracture (risk ratio = 1.86, 95% confidence interval = 1.75 to 1.98), (2) the risk ratio for an outcome of any osteoporotic fracture is similar to that for a hip fracture, (3) there is no significant difference in the risk ratio between men and women, and (4) low bone-mineral density explained a minority of the risk for any fracture (8%) and for hip fracture (22%)¹⁰. The United States Surgeon General's report of 2004 emphasizes that: "[Healthcare] Providers should be aware of a number of red flags that might signal potential problems with an individual's bone health at different ages. One of the most important flags is a previous fragility-related fracture."¹¹ Since orthopaedic surgeons are often involved in fracture care, we must consider playing a more central role in the management of overall bone health.

It has been shown that the timely initiation of treatment with an antiresorptive agent (e.g., some bisphosphonates) following an osteoporotic fracture can increase bone-mineral density and lower fracture risk within months¹²⁻¹⁷. With some pharmacological agents, this effect may be more strongly related to enhancement of bone quality than to an increase in bone-mineral density¹⁸. Furthermore, current data, although limited, indicate that commonly used bisphosphonates do not substantially impair, and may enhance, fracture-healing. Although there has been contradictory evidence that bisphosphonates may delay maturation of fracture callus, the available data suggest that this delay does not substantially reduce mechanical strength during this phase of healing in normal bone¹⁹. Most other commonly used agents for decreasing bone loss (e.g., nasal spray calcitonin, conjugated estrogens, and selective estrogen receptor modulators) are also not known to substantially impair bone-healing. Therefore, although current data are limited, there appears to be enough evidence to support the initiation of pharmacological treatment (e.g., with an antiresorptive or anabolic agent and with calcium and vitamin-D supplements) in a "timely" fashion (i.e., once it is deemed medically safe and prudent) in order to prevent future fractures.

Orthopaedic surgeons may be in an ideal position to initiate such pharmacological intervention(s) as they are generally the first physicians to evaluate and treat patients with a low-energy fracture. Despite the increasing momentum in the academic orthopaedic community for orthopaedic surgeons to become more involved in general with facilitating medical management of their patients with an osteoporotic fracture, it is unclear how strongly orthopaedic surgeons consider treating these patients rather than referring them for treatment and whether they consider initiating medical treatment of pa-

tients with an osteoporotic fracture to be a necessary extension of their responsibilities²⁰.

An increasing number of publications suggest that orthopaedic surgeons, in general, can and should be more involved in ensuring a diagnostic workup and medical care for their patients with osteopenia and osteoporosis²¹⁻²⁸. A recent survey of members of the American Academy of Orthopaedic Surgeons (AAOS) suggested that orthopaedic surgeons are interested in providing better medical care for patients with osteoporosis (www.aaos.org/wordhtml/bulletin/aug99/fline1.htm). Of surgeons who had "extensive" involvement in treating patients with osteoporosis, 78% strongly agreed that expansion of their practice into nonsurgical domains such as treatment of osteoporosis would be appropriate. However, a recent study showed that orthopaedic surgeons in our geographical region were not inclined to facilitate timely medical treatment and follow-up of patients with an osteoporotic fracture²⁹. What is the reason for this seeming contradiction? Our hypothesis was that many orthopaedic surgeons do not consider medical management to be inextricably linked to the surgical care of patients with an osteoporotic fracture. Additionally, we hypothesized that many orthopaedic surgeons have concerns about assuming the additional responsibilities and liabilities of pharmacological and other medical treatments for the short and long-term care of patients with osteoporosis. The present study was conducted in order to (1) assess the opinions and the fund of knowledge within a community of orthopaedic surgeons regarding the medical treatment of their patients with osteoporosis and osteoporotic fractures, and (2) compare those findings with the responses by previously surveyed surgeons (from the same geographical area) who were generally not inclined to facilitate medical care of their patients following a fracture.

Materials and Methods

In 2001, a survey composed of twenty-two questions was administered by our research team, with use of the method described below, to fourteen orthopaedic surgeons from central and northern Utah. This survey queried these surgeons prior to their participation in a study that showed that the majority (twelve) of the fourteen were not inclined to consistently facilitate medical care of their patients with an osteoporotic fracture²⁹. The survey was subsequently used (in the present study) to determine if this group of fourteen surgeons resembled their geographical peers regarding their knowledge, opinions, and method(s) of initiating and managing medical treatment (if any) for patients with an osteoporotic fracture. This comparison was accomplished by mailing the same survey, in 2002, to an additional 157 surgeons in the same geographical area (Utah, Idaho, and Wyoming). The responses from the ninety-three surveys that were returned by the larger group of surgeons were compared with the responses from the original fourteen surgeons (who were not resurveyed). In addition, we analyzed the cumulative responses from the two surveys (a total of 171 total mailed surveys and 107 [93 + 14] respondents).

The content of the survey was developed from data

obtained from interviews with orthopaedic surgeons and internal medicine physicians specializing in the care of osteoporosis as well as from a literature review and various other sources listed in Cochrane database reviews (www.update-software.com/abstracts/ab001983.htm, [ab004523.htm](http://www.update-software.com/abstracts/ab004523.htm), [ab001347.htm](http://www.update-software.com/abstracts/ab001347.htm), and [ab004526.htm](http://www.update-software.com/abstracts/ab004526.htm)). The form of the survey questions and responses were patterned after the AAOS survey (www.aaos.org/wordhtml/bulletin/aug99/fline1.htm) and in accordance with closed-ended questions with ordered response categories as described by Dillman³⁰. Survey questions addressed the respondent's knowledge about both osteoporosis and osteoporotic fracture care as well as opinions regarding appropriate treatment interventions and related responsibilities. Rigorous validation of the survey was not conducted.

The mailing addresses of the surveyed surgeons were obtained from the 2001 membership directories of the American Academy of Orthopaedic Surgeons, the American Board of Orthopaedic Surgery, and the Utah, Idaho, and Wyoming Medical Associations. The survey was sent to prospective respondents with a transmittal letter (see Appendix) from the Utah Osteoporosis Center that listed the two codirectors, who are both orthopaedic surgeons. No distinction was made regarding whether a surgeon was in private practice, at an academic center, or in a rural or urban area. Only approximately 20% of the returned surveys contained complete information regarding the surgeon's age, years in practice, and subspecialty, and when that information was missing, it was obtained from AAOS web pages, AAOS membership directories, or telephone calls to the surgeons' offices. The practice of each surgeon was defined according to one of the following categories: general, pediatrics, sports, joint, trauma, spine, foot and ankle, or hand.

The surveys were first mailed in mid-September, and a second mailing, to the nonresponders, was carried out three months later. No remuneration was offered to the responders. Of the 171 surveys that were sent, 107 completed surveys were returned (a 63% response rate); the respondents included the fourteen surgeons from our previous study and ninety-three additional surgeons from the same geographical area. The results were compiled six months after the first mailing.

To assess possible differences between the responders and nonresponders, surveys were resent to the nonresponders along with a transmittal letter from the principal investigator that stated the importance of the study and that completion of the survey was essential to ensure the statistical reliability of the study. Fifteen additional surveys were obtained from this group of surgeons who had not responded to the previous mailings, and the results of their surveys were compared with those of the entire group of responders.

Statistical analysis of each intergroup comparison was accomplished with a two-sided statistical test appropriate for the type of answer options for each question: the Fisher exact test was used for two categorical options; the Fisher-Freeman-Halton test, for unordered categorical options with more than two categories³¹; and the Wilcoxon-Mann-Whitney test, for ordered categorical options³². For questions with multiple responses, the frequency of each response was compiled in a

cross-tabulation table, and significance was tested with use of a Fisher-Freeman-Halton test on a table of unique combinations of response items as the rows and groups as the columns³³. The unequal variance t test was used for comparisons of means for continuous variables. In all cases, $p \leq 0.05$ was considered significant.

Results

The survey questions and accompanying responses are shown in the Appendix. A subset of questions and responses is also shown in graphical form in Figure 1. The fourteen surgeons in the small group were, on the average, younger than the ninety-three surgeons in the large group (mean and standard deviation, 40.4 ± 4.7 years compared with 52.8 ± 10.1 years; $p < 0.001$). Also, the small group of surgeons had been in practice for less time than the large group (8.9 ± 5.7 years compared with 22.9 ± 10.1 years, $p < 0.001$; question 21). The relative proportions of subspecialties did not differ significantly between the two groups ($p = 0.737$; question 22). Because of the small sample sizes, statistical comparisons regarding responses to each of the questions could not be reliably conducted between specialties.

The answers to only one question (question 2) differed significantly ($p = 0.052$) between the 107 responders and the fifteen surgeons (of the sixty-four initial nonresponders) who did not respond to the first two mailings but did respond to the third. The majority (68%; seventy-three) of the responders agreed or strongly agreed that expanding orthopaedic practice to include prescribing pharmacological treatments for osteoporosis was appropriate, whereas the majority (57%; eight) of the initial nonresponders disagreed or strongly disagreed that this was appropriate. There was also a tendency toward a significant difference between the responders and the (initial) nonresponders with regard to their answers to question 4 ($p = 0.077$): 73% (eleven) of the nonresponders compared with 47% (fifty) of the responders were concerned enough about adverse events associated with pharmacological agents used in treating osteoporosis that they would rather avoid prescribing them.

The response profiles for most questions did not differ significantly between the fourteen surgeons who participated in the previous study²⁹ and the additional ninety-three surgeons who were surveyed in the same geographical area. Only the responses to question 9 (regarding a willingness to perform a workup to seek secondary causes of osteoporosis; $p = 0.004$) and question 15 (regarding routine reporting of a suspicion of osteoporosis to the patient's primary health-care provider; $p = 0.034$) differed significantly between the two groups.

Because the responses to most questions did not differ significantly between the large and small groups, the results reported below reflect the responses from the total group of 107 respondents.

Fifty-one percent (fifty-five) of the 107 orthopaedic surgeons believed that an apparent osteoporotic fracture and several other clinical risk factors were sufficient reasons to consider initiating pharmacological treatments. However, 72% (seventy-seven) of the 107 surgeons stated that they would

consider initiating treatment, in most cases, if a patient with an apparent osteoporotic fracture and other risk factors *also had* confirmation of osteoporosis by a DEXA scan. Forty percent (forty-three) of the surgeons did not indicate that they were aware that a low-energy fracture in a postmenopausal woman might be a more powerful predictor of a future fracture than low bone-mineral density demonstrated by a DEXA scan, but 63% (sixty-seven) stated that they knew that a low-energy fracture in a patient at risk for osteoporosis might be a stronger indication for the initiation of pharmacological treatment than a DEXA scan showing osteoporosis. Seventy-one percent (seventy-five) of the 105 surgeons responding believed that there was a substantial lag time before medical treatment

was initiated for patients who had sustained an osteoporotic fracture, but 47% (fifty of 107) thought that initiation of pharmacological treatments between four and sixteen weeks after the fracture represented “timely” management.

An overwhelming majority (94%; 101) of the 107 orthopaedic surgeons strongly considered the diagnosis of osteoporosis when evaluating low-energy fractures in middle-aged or elderly patients. The majority (up to 68%) of the surgeons agreed or strongly agreed that expanding their orthopaedic practice to include prescribing pharmacological treatments for patients with osteoporosis and/or osteoporotic fractures was appropriate. However, most (94%; 101) were concerned about adverse events associated with these agents, and many (47%;

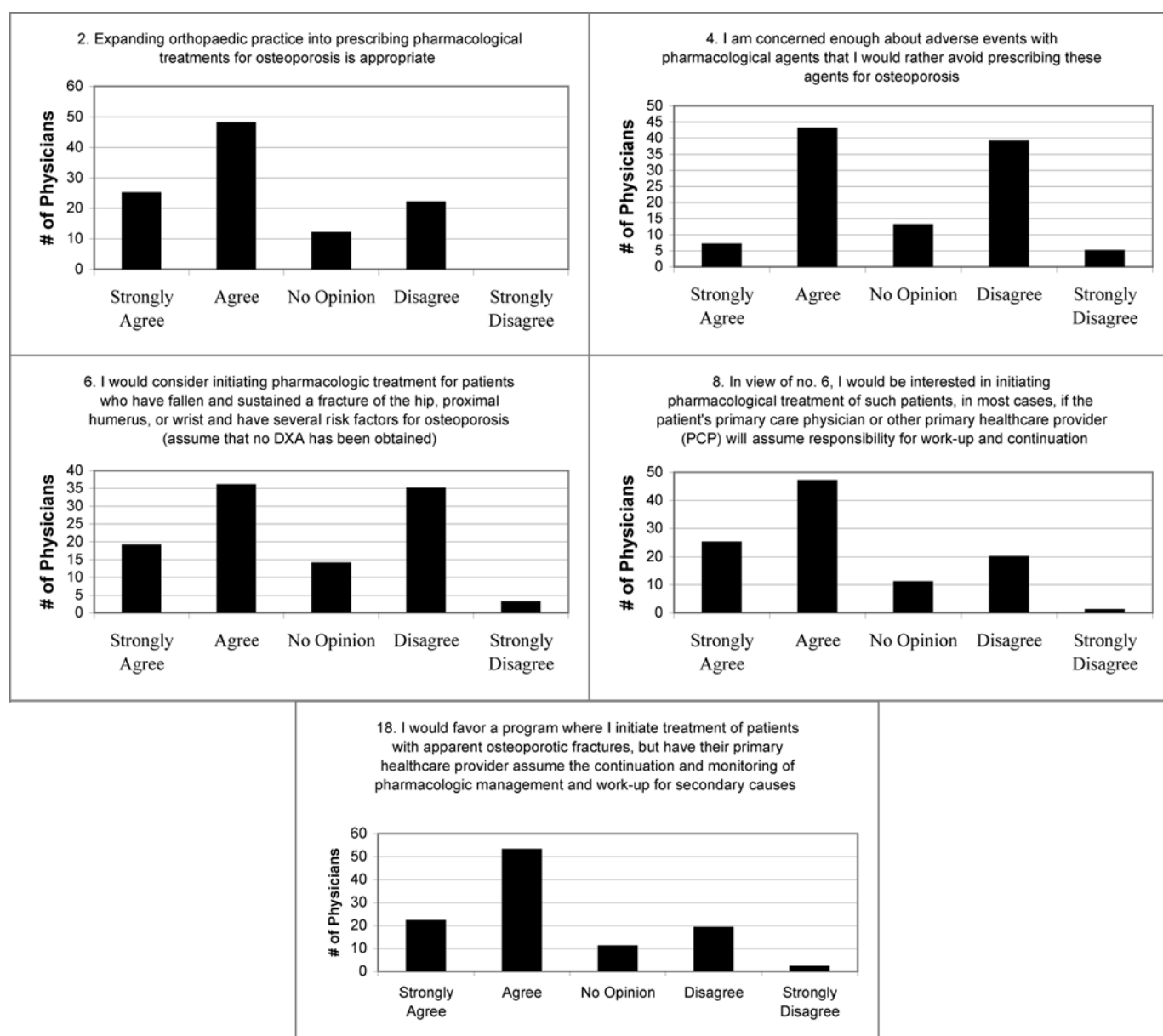


Fig. 1

Selected survey questions and responses.

fifty) were concerned enough about adverse events to avoid prescribing some pharmacological treatments altogether. The agents that they felt most comfortable prescribing included bisphosphonates (74%) and calcium and vitamin-D supplements (>77%). Thirty-five percent (thirty-seven) of the 105 surgeons who responded thought that there were benefits of initiating early antiresorptive pharmacological treatments for patients at risk for osteoporosis. However, 39% (forty-one) stated that they did not know the benefits of early treatment with antiresorptive agents.

Up to 70% of the 107 surgeons said that they would favor a program in which they initiated medical treatment and/or a workup for patients with an apparent osteoporotic fracture, provided that a primary care physician assumed the continuation of pharmacologic management and the workup for secondary causes of osteoporosis. Only 52% of the 107 orthopaedic surgeons stated that they routinely notify the patient's primary care physician after seeing a patient with a probable osteoporotic fracture.

Discussion

A study in 2001 of a group of fourteen orthopaedic surgeons (from the same geographical area as the larger group evaluated in the present study) showed that they were typically not inclined to facilitate timely medical follow-up for patients with an apparent osteoporotic fracture²⁹. The results from the present study, conducted in 2002, suggest that orthopaedic surgeons are interested in *initiating* osteoporosis treatment but are not interested in the subsequent *management* of the osteoporosis treatment. Most of the fourteen surgeons in the initial group displayed a general lack of motivation to refer these patients to a primary care provider for post-fracture medical consultation. In contrast, 56% of the larger group of ninety-three surgeons indicated that they routinely contacted a patient's primary care provider ($p = 0.034$ for the comparison between the two subgroups). Aside from this issue and another question dealing with the workup to identify secondary causes of osteoporosis, the two groups did not differ significantly with regard to their responses to the questionnaire. In view of these similarities, and since the present study surveyed nearly all of the orthopaedic surgeons from the geographical area in which the smaller group of surgeons practiced, the survey results most likely reflect the current status of how orthopaedic surgeons in this region view their role in post-fracture osteoporosis management.

Many surgeons appear to be at an impasse—they recognize the need to initiate medical treatment, but they clearly seem concerned about the implications of the added responsibilities demanded by medical care, particularly with regard to initiating use of some pharmacological agents. Additionally, concerns about liability and potentially time-consuming responsibilities associated with the medical treatment of osteoporosis may prompt some surgeons to defer such treatment to others. Determining the reasons why a substantial percentage of orthopaedic surgeons choose not to take responsibility for medical management of osteoporosis remains a challenge. Ex-

planations for this hesitancy could range from insufficient training to allowing another physician the courtesy of dictating therapy. This latter approach to the management of osteoporotic patients, which undermines neither the interest nor the importance of orthopaedic surgeons in recognizing and ensuring appropriate treatment, was not explored in the survey. Additional studies are needed to determine specific reasons why many orthopaedists have chosen not to take responsibility for medical management of osteoporosis.

Although these results probably reflect the current status of post-fracture management in our greater referral area, it is not known if the response profiles of each question can be generalized to surgeons from other regions of the United States. Future reevaluation of the same group of surgeons and comparison with surgeons in areas outside of Utah, Idaho, and Wyoming may clarify some survey responses. For example, 32% of the 107 respondents thought that all nonoperative treatment should be the responsibility of a primary care provider, but up to 70% thought that the orthopaedic surgeon should initiate the workup and medical treatment. The issue of surgeons' reluctance to initiate treatment could be explored in more detail, and a clearer definition of "initiation" and its duration would probably clarify why many surgeons are reluctant to assume a more prominent role in post-fracture osteoporosis management. For example, despite their high correlation with osteoporosis, not all "low-energy" fractures, especially in the spine, are diagnostic of osteoporosis. Many orthopaedic surgeons might interpret questions about initiating osteoporosis management as ignoring other important-to-treat disorders (e.g., myeloma in the spine or carcinoma with metastases to the spine). Nevertheless, our findings suggest that the majority of respondents viewed their role as a surgeon, not as a coordinator of osteoporosis management. These results parallel those in a study showing that orthopaedic surgeons were consistent in their opinion that post-fracture attention to osteoporosis should rest with the primary care physician²⁰. It is encouraging, however, that orthopaedic surgeons are becoming more aware of the far-reaching clinical implications of these fractures^{22,26,27,34} and that, with help in coordinating their efforts, orthopaedists can become part of the solution—i.e., by ensuring that patients are informed, educated, and evaluated for the treatment or prevention of osteoporosis. This interest is also demonstrated by the efforts of the AAOS to raise awareness that perhaps the most effective way to increase bone mass is to ensure adequate exercise, dietary habits, and calcium intake during adolescence. Questions for future survey studies should also be aimed at documenting surgeons' actual practice (in addition to opinions) regarding initiating and/or facilitating medical management for fragility fractures. For example, it would be important to determine what percentage of the respondents actually prescribed tests for diagnosing this disease and medications to treat it and if there are significant changes in this percentage in the ensuing decade.

The comparison of the 107 surgeons who responded to the initial mailings with the fifteen who did not initially re-


spond revealed only one question to which the responses were significantly different between the groups. However, the small number of initial nonresponders who subsequently responded (fifteen of the sixty-four initial nonresponders) limited our ability to draw any strong conclusions about whether there was a difference between these groups. Furthermore, question 4 (regarding concern about adverse events of the pharmacological agents) may also suggest a substantial difference between the two groups, although the *p* value was 0.077. In addition, orthopaedic surgeons who are disinclined to diagnose and/or treat osteoporosis also might be disinclined to complete the questionnaire. Therefore, we are reluctant to state that the entire group of sixty-four nonresponders was not substantially different from the group that responded to the initial mailings. In future studies, additional efforts should be made to more rigorously determine potential differences between responders and nonresponders.

It has been suggested that standardized treatment/intervention programs may be useful in helping orthopaedic surgeons to facilitate effective medical treatment for the secondary prevention of osteoporotic fractures^{26,27,29,35-37}. One well-described program involves a hospital-based service in which nurse-practitioners and other nonsurgeon health-care providers work as a team to supervise post-fracture care and additional workup (e.g., to identify secondary causes of osteoporosis), which allows the orthopaedic surgeon to simply initiate the program³⁵. Such programs may include standing discharge orders that initiate workup and implement treatment with antiresorptive and/or anabolic agents, calcium, and other interventions. Additional studies are needed to determine the value of such programs.

In conclusion, a majority of orthopaedic surgeons in the geographic area of Utah, Idaho, and Wyoming believe that they can and should expand their role in the medical treatment of patients with an osteoporotic fracture. However, many of these orthopaedic surgeons are hesitant and/or unwilling to initiate medical treatment. The survey also suggests that the surgeons who feel comfortable treating osteoporosis may provide inadequate treatment, since only 38% of the respondents stated that they were willing to initiate a workup to

look for secondary causes of osteoporosis. In this context, it may not be reasonable at this time to promulgate an active role for orthopaedic surgeons in a program that includes the initiation of "early" pharmacologic therapy merely for the sake of intervening. Such activity, without an appropriate medical workup, could incur substantial complications or result in the oversight of secondary causes of osteoporosis. It is also clear from the survey that a relatively large proportion (32%) of orthopaedic surgeons do not want to assume responsibility for managing medical aspects of osteoporosis in their patients who have sustained a fracture.

Appendix

 The transmittal letter and survey are available with the electronic versions of this article, on our web site at jbjs.org (go to the article citation and click on "Supplementary Material") and on our quarterly CD-ROM (call our subscription department, at 781-449-9780, to order the CD-ROM). ■

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