3-year follow-up of 215 fracture patients from a prospective and consecutive osteoporosis screening program

Fracture patients care!

Jörgen Åstrand[1], Karl-Göran Thorngren[1], Magnus Tägil[1], and Kristina Åkesson[2]

Department of Orthopedics, Lund University, [1]Lund University Hospital and [2]Malmo University Hospital, Sweden
Correspondence JÅ: jorgen.astrand@med.lu.se
Submitted 07-05-08. Accepted 07-11-11

Background and purpose **Fractures can be prevented if osteoporosis is identified and treated. Starting in 2002, we have been using a screening program in which patients between 50 and 75 years of age with a wrist, shoulder, vertebral, or hip fracture are assessed by DEXA of the hip and spine and if osteoporostic or osteopenic, they are encouraged to see a doctor of their own choice. The patients receive documents containing information, the results of DEXA, and a letter to present to their doctor with suggestions regarding blood tests and treatment. Here we report the 3-year follow-up regarding compliance to the recommended treatment.**

Methods **A questionnaire was sent to fracture patients who participated in the initial screening study from November 2002 through November 2003. Questions included whether they had seen a doctor, whether treatment had been initiated, and their opinions about osteoporosis.**

Results **215 of the 236 patients answered the questionnaire, with a mean follow-up of 39 months. 76/87 of those with osteoporosis, 70/99 of those with osteopenia, and 11/29 of those with normal BMD had seen a doctor. Anti-resorptive treatment was prescribed to two-thirds of the osteoporotic patients, to one-sixth of the osteopenic patients, and to none of the patients with normal bone density. Calcium-vitamin D supplementation as monotherapy was given to one-third of the osteoporotic patients, to half of the osteopenic patients, and to half of the normal patients. Only a few osteoporotic patients, one-third of the osteopenic patients, and half of the normal patients received no treatment. Compliance to treatment was 80% over 3 years in those treated. Most patients felt that they could influence their skeletal health.**

Interpretation **Screening of fracture patients for osteoporosis effectively identifies patients with low bone mineral density and the patient can be trusted to seek appropriate medical advice for treatment of osteoporosis. Based on the bone scan diagnosis, the treatment that these patients received reflects current treatment guidelines well.**

Osteoporosis can be treated pharmacologically to reduce fracture risk (Black et al. 1996). Treatment involves agents that reduce bone resorption, such as bisphosphonates (Black et al. 2006), and also bone anabolic agents (Mulder et al. 2006). It is difficult to identify those in need of treatment since the early stages of osteoporosis are not associated with symptoms. It is possible to measure bone mineral density (BMD) with dual-energy X-ray absorptiometry (DEXA). While low BMD is a strong risk factor regarding fracture (Blake and Fogelman 2007), a finding of low BMD does not provide information regarding bone quality or trabecular connectivity—but a fracture in itself signals reduced bone strength (Dalle Carbonare and Giannini 2004, Genant et al. 2007). The first fracture is therefore an opportunity not to be missed in identifying those with low BMD who are in need

DOI 10.1080/17453670710015328

of treatment (Mallmin et al. 1993, Jutberger et al. 2003, Freedman et al. 2007). It seems logical to organize osteoporosis screening at departments of orthopedics. We have previously reported results of such a screening program at our department, where patients between 50 and 75 years of age presenting with a wrist, proximal humerus, vertebral, or hip fracture were referred for a DEXA scan (Åstrand et al. 2006). Based on the bone density measurement, the results were classified as normal, osteopenia, or osteoporosis. The patients received a letter with information and written copies of the results. If the diagnosis based on the DEXA results was osteoporosis or osteopenia, the patient was encouraged to contact his or her own primary care physician or a doctor of his/her own choice for further evaluation, and to present the letter of admission from us containing suggestions regarding blood tests and treatment according to current Swedish guidelines (SBU report 2003). Blood tests are recommended in order to check for secondary osteoporosis, such as parathyroid or kidney-related disease. Patients with a normal result by DEXA received information and a suggestion that they should inform their primary care physician at their next regular visit. We left it to the patients and their physician to decide on any additional clinical investigation or treatment; thus, we neither decided nor knew whether our screening had any effect on the clinical management of the patient. The hypothesis in this study was that our patients (together with their physician) would be able to make the relevant decisions and that our screening would result in appropriate treatment for osteoporosis, which would not otherwise have been prescribed. This follow-up study was conducted in order to evaluate medium-term treatment outcomes 3 or more years after the initial screening at the time of fracture.

Patients and methods

This screening study involved 239 fracture patients who were mean 64 (50–75) (SD 7) years of age when they presented at the Department of Orthopedics, Lund University Hospital, during the inclusion period (November 2002 through November 2003). Patients who were included had sustained fractures of the wrist, hip, vertebrae, or proximal humerus (Åstrand et al. 2006).

A follow-up questionnaire was sent out in the spring of 2006 (follow-up time mean 39 (32–48) months). Patients were asked whether they had visited a doctor and, if so, the specialty of the doctor: primary care physician, gynecologist, or a doctor with another kind of specialization. The patients were also asked whether they had had blood tests taken during the evaluation and if exercise and diet had been discussed. If treatment had been prescribed, the patients were asked what type of treatment this had been, and whether they had taken their medication regularly. The questionnaire also included questions on patients' perception of care and osteoporosis: whether they felt that they had participated in the treatment decisions, whether they considered osteoporosis an important issue to them, whether their knowledge about osteoporosis was sufficient, and whether they felt that they could influence their skeletal health.

Results

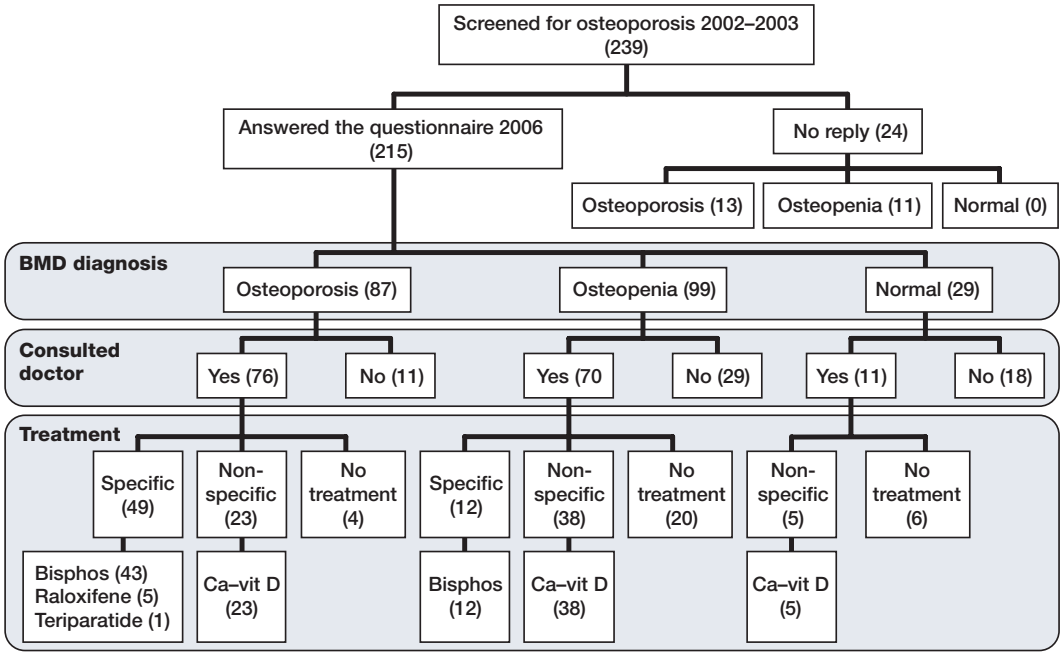
Response rate

215 of the 239 patients (90%; 174 women, 41 men) who had undergone DEXA during the first year of the initial screening answered the follow-up questionnaire (Figure). In the osteoporotic group, 1 was living abroad and 2 were too sick to participate further. In the osteopenic group, 3 patients could not participate due to neurological conditions and 2 had died. Apart from this, our records are incomplete regarding the reasons for non-participation. 157 patients (73% of those who had responded) had been in contact with a doctor: 76 patients with osteoporosis, 70 patients with osteopenia, and 11 patients with normal BMD.

Intervention

Specific anti-resorptive therapy (e.g. bisphosphonates, selective estrogen receptor modulators (SERMs)) was prescribed to two-thirds of the patients with osteoporosis, to one-sixth of the patients with osteopenia, and to none of the patients with normal bone density (Figure).

Non-specific therapy—calcium-vitamin D as monotherapy—was prescribed to 23 patients in the



Flow-chart of the study. 239 patients participated in the post-fracture screening program (November 2002 through November 2003) and 215 participated in the follow-up after 3 years.

osteoporotic group, whereas 4 were not given any medication. 38 in the osteopenic group received the same treatment, and 20 were untreated. 5 patients in the normal group received calcium-vitamin D, and 6 were not treated (Figure).

In the osteopenia group of 99 patients, 23 patients who had severe osteopenia (T-score below –2.0) (SD 7) were prescribed bisphosphonates. 12 received calcium and vitamin D as monotherapy, whereas 4 patients did not receive any treatment.

Compliance

Of the 72 patients with osteoporosis who were treated and responded to the questionnaire, 61 claimed to have taken their medication regularly. In the osteopenic group, 40 of 50 patients who were treated and responded to the questionnaire claimed to have taken their prescribed medication on a regular basis. 3 of 5 in the normal group claimed to take their calcium-vitamin D regularly (Table 1).

Preferred physician

Regardless of which diagnostic group the patients were allocated to based on BMD, most patients (71%) consulted their primary care physician. The remaining patients went to another specialist, and only a few to a gynecologist (Table 2). The investigation included blood tests in 60% of the osteoporotic patients, in half of the osteopenic patients, and in less than one-third of the normal patients (Table 2).

Table 1. Patient-reported compliance. For those reporting non-compliance the type of medication prescribed is indicated

	Osteoporosis	Osteopenia	Normal
Compliant	61	40	3
Non-compliance	11	10	2
Bisphosphonates	4	1	
Raloxifene	2		
Ca-vit D	5	9	2
Total	72	50	5

Opinions

About one-third of the patients had discussed diet and exercise with their physicians. About half of the patients felt that they had participated in the decisions and most felt that osteoporosis was of personal concern—and something that they needed

Table 2. Specialty of the physician visited and laboratory investigation according to diagnosis by DEXA

	Osteo-porosis	Osteo-penia	Normal
Primary care physician	41	55	8
Gynecologist	2	2	0
Other specialty	31	11	3
Not specified	2	2	0
Blood testing performed			
Yes	46	35	3
No	29	32	8
No recall	1	3	0

to know about. Overall, less than one-third felt that they knew enough about osteoporosis but more than half felt they could influence their skeletal health (Table 3).

Discussion

We have had an osteoporosis screening program for fracture patients between 50 and 75 years of age since 2002 (Åstrand et al. 2006). The incidence of low bone mineral density that we found is consistent with that in similar programs—such as the fracture liaison service in Glasgow, which was among the first to report its results (McLellan et al. 2003). Our program does not include the ultimate decision about patient management, but the result of this 3-year follow-up shows high patient compliance in seeking medical help regarding osteoporosis, and the answers concerning how important our patients regarded this condition indicate high motivation in finding out and doing something about their skeletal health. The percentage of patients who went to see a doctor based on the results from the bone scan was highest in the osteoporotic group (90%) and lowest in those with normal BMD (38%). This may reflect the importance the patients themselves place on the results of bone density measurement: the more severe the condition, the stronger is the urge to seek medical help in receiving appropriate treatment. Other authors have also found a high degree of compliance in osteoporotic patients (Edwards et al. 2005, Blonk et al. 2007)

We conclude that in the case of osteoporosis, patients themselves are capable of making adequate decisions about their health and their need for medical care. We acknowledge that the patients in our screening program were somewhat younger (50–75 years) than those who suffer the majority of fragility fractures, but we believe that identification of patients with a first fracture in this age group is crucial in order to prevent future fractures.

Regarding patient compliance with regard to medication, we found high compliance in the osteoporotic and osteopenic groups, which has also been reported by others (Chevalley et al. 2002, Blonk et al. 2007, Kuo et al. 2007). This might possibly be explained by neglecting to report one's own low compliance, but we interpret it as another indication of high patient motivation in general regarding the willingness of patients to seek treatment for osteoporosis. One drawback of our study, however, is that we have no record of why treatment was discontinued in those who reported non-compliance.

In the osteoporotic group, half of the patients consulted a primary care physician and almost half another specialist. In the ostopenic and normal groups, roughly two-thirds of patients went to a

Table 3. Opinions about osteoporosis according to diagnosis by DEXA

	Osteoporosis (n = 87)			Osteopenia (n = 99)			Normal (n = 29)		
	Yes	No	NA [a]	Yes	No	NA	Yes	No	NA
Did your doctor discuss diet and exercise with you?	37	37	13	36	34	29	7	3	19
Did you feel that you were part of the decision-making?	49	23	15	41	20	38	8	4	17
Do you think osteoporosis is something that concerns you and something you need to know about?	74	4	9	78	9	12	17	2	10
Do you feel that you know enough about osteoporosis?	31	44	12	24	58	17	10	7	12
Do you think you can influence your skeletal health?	51	23	13	61	20	18	19	1	9

[a] NA: no answer.

primary care physician. Patients with osteoporosis may prefer to seek hospital-based care, but this might also reflect the fact that osteoporotic patients generally have multiple medical problems that are already under the care of a specialist. This has been observed by others (Holmberg et al. 2006).

Our screening service is organized at an orthopedics department, and we consider this to be an advantage since almost all fracture patients visit us. Our follow-up shows that the service results in treatment. Anti-resorptive treatment was used in two-thirds of the patients with osteoporosis, and about one-third of patients with severe osteopenia (with T-score below –2.0 to –2.5) received bisphosphonates. Some recommendations suggest that anti-resorptive treatment should be initiated already at a T-score of –2.0 or less at either the spine or hip in patients with a fracture (McLellan et al. 2003, Gajic-Veljanoski et al. 2007). According to these recommendations, our results could be interpreted as under-prescription, but contraindications such as patient reluctance towards treatment, gastrointestinal problems, neurological conditions, other disabilities, or reluctance to treat those who are relatively younger could also explain these findings. Some authors have expressed concern that a cutoff point for treatment at a T-score below –2.0 raises the number needed to treat (NNT) significantly, and thus reduces the cost effectiveness of this type of intervention (Blonk et al. 2006).

Among the limitations of our study is the lack of recording of possible contraindications against treatment. In addition, we do not know whether blood tests revealed any secondary causes of osteoporosis that might explain why treatment of osteoporosis was not indicated (Table 1). Our intention was to send a short questionnaire in order to ensure a high response rate.

Based on this first experience from our osteoporosis screening set-up, it seems possible to increase its effectiveness. Steps that we have taken as a result of the findings in this study include improvement of patient information by including a brochure with information on osteoporosis. We now also specifically target the younger patients in order to motivate them to take measures against a condition that is generally perceived to be a disease affecting the elderly. Furthermore, detailed information on the degree of osteopenia (mild, moderate, or severe) is now included in the letter of admission to help the treating physician to determine the adequate threshold for intervention. Continuous efforts are being made to optimize the routines for finding fracture patients in order to minimize patient dropouts, and also to improve the design of the risk factor questionnaires sent to the fracture patients studied with DEXA. Finally, actively building relationships with colleagues in the primary healthcare system will hopefully enhance motivation and knowledge in order to adequately treat those patients who are at the highest risk of fracture.

Contributions of authors

JÅ: study concept and design, acquisition, analysis, and interpretation of the data and drafting of the manuscript. MT: design of the questionnaire. KÅ and KGT: review of the manuscript.

The authors thank Ulla-Britt Ohlsson and Ann-Christin Sörensen for identifying patients and for taking care of correspondence. This study was supported by a grant from MSD.

JÅ and KGT have received speaker's fees from Aventis and MSD. KÅ has received speaker's fees from Aventis, Lilly, MSD, and Nycomed.

Black D M, Cummings S R, Karpf D B, Cauley J A, Thompson D E, Nevitt M C, Bauer D C, Genant H K, Haskell W L, Marcus R, Ott S M, Torner J C, Quandt S A, Reiss T F, Ensrud K E. Randomised trial of effect of alendronate on risk of fracture in women with existing vertebral fractures. Fracture Intervention Trial Research Group. Lancet 1996; 348: 1535-41.

Black D M, Schwartz A V, Ensrud K E, Cauley J A, Levis S, Quandt S A, Satterfield S, Wallace R B, Bauer D C, Palermo L, Wehren L E, Lombardi A, Santora A C, Cummings S R; FLEX Research Group. Effects of continuing or stopping alendronate after 5 years of treatment: the Fracture Intervention Trial Long-term Extension (FLEX): a randomized trial. JAMA 2006; 296 (24): 2927-38.

Blake G M, Fogelman I. Role of dual-energy X-ray absorptiometry in the diagnosis and treatment of osteoporosis. J Clin Densitom 2007; 10 (1): 102-10. Epub 2006 Dec 27.

Blonk M C, Erdtsieck R J, Werenekinck M G, Schoon E J. The fracture and osteoporosis clinic: 1-year results and 3-month compliance. Bone 2007; 40 (6): 1643-9. Epub 2007 Mar 1.

Chevalley T, Hoffmeyer P, Bonjour J P, Rizzoli R. An osteoporosis clinical pathway for the medical management of patients with low-trauma fracture. Osteoporosis Int 2002; 13 (6): 450-5.

Dalle Carbonare L, Giannini S. Bone microarchitecture as an important determinant of bone strength. J Endocrinol Invest 2004; 27 (1): 99-105. Review.

Edwards B J, Bunta A D, Madison L D, DeSantis A, Ramsey-Goldman R, Taft L, Wilson C, Moinfar M. An osteoporosis and fracture intervention program increases the diagnosis and treatment for osteoporosis for patients with minimal trauma fractures. Jt Comm J Qual Patient Saf 2005; 31 (5): 267-74.

Freedman B A, Potter B K, Nesti L J, Cho T, Kuklo T R. Missed opportunities in patients with osteoporosis and distal radius fractures. Clin Orthop 2007; (454): 202-6.

Gajic-Veljanoski O, Sebaldt R J, Davis A M, Tritchler D, Tomlinson G, Petrie A, Adachi J D, Cheung A M. Age and drug therapy are key prognostic factors for first clinical fracture in patients with primary osteoporosis. Osteoporos Int 2007 Feb 24; (Epub ahead of print)

Genant H K, Delmas P D, Chen P, Jiang Y, Eriksen E F, Dalsky G P, Marcus R, San Martin J. Severity of vertebral fracture reflects deterioration of bone microarchitecture. Osteoporos Int 2007; 18 (1): 69-76. Epub 2006 Oct 7.

Holmberg A H, Johnell O, Nilsson P M, Nilsson J, Berglund G, Åkesson K. Risk factors for fragility fracture in middle age. A prospective population-based study of 33,000 men and women. Osteoporos Int 2006; 17 (7): 1065-77.

Jutberger H, Sinclair H, Malmqvist B, Obrant K. Screening for postmenopausal osteoporosis. Women with distal radius fractures should be evaluated for bone density. Lakartidningen 2003; 100 (1-2): 31-4. Swedish.

Kuo I, Ong C, Simmons L, Bliuc D, Eisman J, Center J. Succesful direct intervention for osteoporosis in patients with minimal trauma fractures. Osteoporosis Int 2007; Epub ahead of print.

Mallmin H, Ljunghall S, Persson I, Naessen T, Krusemo U B, Bergstrom R. Fracture of the distal forearm as a forecaster of subsequent hip fracture: a population-based cohort study with 24 years of follow-up. Calcif Tissue Int 1993; 52 (2): 69-72.

McLellan A R, Gallacher S J, Fraser M, McQuillian C. The fracture liaison service: success of a program for the evaluation and management of patients with osteoporotic fracture. Osteoporos Int 2003; 14: 1028–34.

Mulder J E, Kolatkar N S, LeBoff M S. Drug insight: Existing and emerging therapies for osteoporosis. Nat Clin Pract Endocrinol Metab 2006; 2 (12): 670-80. Review.

SBU-report 165/1 (The Swedish Council on Technology Assessment in Health Care). Osteoporosis-prevention, diagnosis and treatment. A systematic literature review (in Swedish) 2003: 113-6. ISBN 91-87890-86-0.

Åstrand J, Thorngren K G, Tägil M. One fracture is enough! Experience with a prospective and consecutive osteoporosis screening program with 239 fracture patients. Acta Orthop 2006; 77 (1): 3-8.