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Original Article

Improving compliance to osteoporosis workup and treatment in postmenopausal patients after a distal radius fracture

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ABSTRACT

Objective: Distal radius fracture (DRF) in postmenopausal women is often the first clinical sign of osteoporosis (OP). Despite the availability of effective treatments, only a minority of patients who sustain a fragility fracture are tested for OP. The purpose of this study was to examine whether a simple intervention by the hospital staff increases rates of OP workup.

Materials and Methods: We conducted a prospective randomized clinical trial. Ninety nine patients after DRF were randomized to two groups. Both groups were contacted after their fracture and were asked to answer a questionnaire and were informed about the possible relationship between DRF and OP. In the intervention group, patients were sent an explanatory pamphlet and a letter to their primary care physician. An additional survey was conducted to establish whether the intervention improved the number of patients who undergo OP workup.

Results: The intervention increased the proportion of patients who turned to their primary care physician from 22.9% to 68.6%, and increased the proportion of patients undergoing OP workup from 14.3% to 40% ($p < 0.001$).

Conclusion: Women with DRF who receive an explanation about possible OP implications and are sent explanatory materials are more likely to undergo OP workup.

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Introduction

Osteoporosis (OP) is a common disease, affecting 8 million people in the United States alone, 4–6 million of whom are women. An even larger number of people suffer from decreased bone mass that could lead to OP in the future [1,2]. It is estimated that more than half of all women over the age of 50 years will suffer from osteoporotic fractures and conversely, more than 80% of fractures in postmenopausal women are related to OP [1].

Fragility fractures are a major public health problem, with over 1.5 million injuries occurring each year in the United States. Among these fractures, distal radius fractures (DRFs) are a major cause of morbidity as patients have a two- to fourfold increased risk of a

subsequent fracture compared to individuals with no prior fracture [3–5]. Women with a DRF typically have lower bone mineral density (BMD) compared with age-matched controls [6,7]. These fractures have enormous physical, psychological, and social consequences for patients, including serious physical injury and reduced quality of life, and are also a source of substantial cost to health systems worldwide. There have been a limited number of randomized controlled trials, mainly using multifactorial interventions, aiming to prevent recurrence by detecting and treating OP.

OP can be treated when diagnosed. Various pharmacologic agents have been shown to increase BMD and decrease the incidence of future fractures [8]. However, treatment of OP is not as common as might be expected based on its prevalence. Several studies have shown that only 24% of women over the age of 60 years, who have suffered from a fracture, undergo subsequent OP workup or treatment [1,9]. More specifically, studies regarding DRF have shown that only 15–25% of women who sustained a fracture were referred for further workup or treated [1,9–12]. The purpose

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First personal questionnaire	Second personal questionnaire
1. Date _____	1. Date _____
2. Full name _____	2. Did you receive the explanation pamphlet? _____
3. ID number _____	3. Did you read the explanation pamphlet? _____
4. Age _____	4. Did you consult your primary physician? _____ _____
5. Education _____	5. Have you performed a BMD test? _____
6. Do you perform any physical activity? _____	6. Are you receiving treatment for osteoporosis? _____
7. Tel. number _____	7. How did the first conversation and pamphlet contributed in performing a workup? _____ _____
8. Date of fracture _____	8. Comments _____ _____
9. Details of primary physician _____	
10. Were you ever diagnosed as having osteoporosis? _____	
11. Did you receive prior to the fracture any treatment or supplements for osteoporosis? _____	
12. Did you receive an explanation about the fracture and its possible relation to osteoporosis? _____ _____	
13. Were you referred for diagnostic tests (BMD)? _____ _____	
14. Were you diagnosed with osteoporosis? _____ _____	
15. Do you receive osteoporosis treatment? _____ _____	
16. Comments _____ _____	

Fig. 1. Questionnaires used in the first and second surveys in the study. BMD = bone mineral density.

of this study was to investigate whether a simple clinical intervention after sustaining a DRF will encourage patients to visit their primary care physician and undergo OP workup.

Methods

Setting

The study was conducted in the Orthopedic Department at Hadassah medical center, Jerusalem, Israel. The Institutional Review Board, in accordance with the Helsinki declaration, approved the study.

Study population

All female patients aged 48–70 years who were diagnosed with DRF by the emergency room (ER) during the years 2005–2007 were eligible for this study. An oral informed consent was obtained from all patients who were suitable and willing to participate in the study in accordance with the approval of the Institutional Review Board. The exclusion criteria were: (1) patients diagnosed or treated for OP prior to the fracture; (2) patients with tumor-related pathologic fractures; and (3) patients who are chronically treated with steroids.

Study design

Patients who sustained a DRF were identified after reviewing all orthopedic ER X-rays. Patients were divided into two groups using an Internet-based randomization plan: an intervention group and a control group. Patients in both groups were contacted by telephone 6–8 weeks after sustaining the DRF and asked to answer a

questionnaire regarding their knowledge about the relationship between fragility fractures and OP, and whether they had been referred for OP workup (Fig. 1).

After the first telephone survey, only the intervention group patients were sent an explanatory pamphlet. An article concerning OP with a letter addressed to their primary care physician that recommended further diagnostic workup was also sent to patients in the intervention group [1].

The outcome was established by an additional second telephone survey for both the control and intervention groups (Fig. 1) conducted 6–8 weeks after the first telephone conversation. A positive outcome of the intervention was considered to be the patient's referral to their primary care physician and undergoing an OP workup.

Statistical analysis

Data were analyzed using the SPSS 11.0 PC program (SPSS Inc., Chicago, IL, USA). Power analysis revealed that a sample size of 40 women is needed in each group to identify a twofold increase in OP workup with an 80% power and 0.05 beta. Group data were compared using cross-tab analysis, including Chi-square and correlation tests.

Results

During the study period, 99 patients were diagnosed with a DRF. At the ER, only one patient received a basic explanation about their fracture and has been informed regarding its possible association to OP.

Fifty patients were randomized to the intervention group and the control group consisting of 49 patients. Twenty nine patients

were excluded from the study (15 patients vs. 14 patients in the intervention and control groups, respectively). These patients were excluded due to prior diagnosis of OP or problems encountered during the first telephone contact (incorrect details, language barrier). There were no significant differences between the control and the intervention groups in terms of age (average 59 years vs. 57.5 years, respectively; $p = 0.435$), ethnicity (Arab vs. Jew), and prior diagnosis of OP.

Table 1 presents the rates of OP workup and diagnosis following the fracture in both groups. No significant differences were noted between the groups.

At the second telephone contact, it was established that 33 (94.3%) of the patients from the intervention group had received and read the explanatory pamphlet and consequently, 24 (68.6%) had contacted their primary care physician. Fourteen of the 35 patients of the intervention group (40%) had undergone OP workup, of which five patients were found to be within the normal bone density range, three patients were diagnosed as having osteopenia, and three were diagnosed as suffering from OP. In addition, three more patients had undergone OP workup but did not have their final results at the time they were contacted. The results of the intervention are presented in Table 2.

Discussion

Our study examined the effectiveness of a simple intervention on the rates of OP workup in patients who sustained a DRF. The intervention included patient information and the primary care physician's awareness of the possible association between these fractures and OP. This intervention was found to increase the proportion of patients who turn to their primary care physician for further information about the disease from 22.9% to 68.6% and the proportion of patients undergoing a diagnostic examination, from 14.35% to 40% ($p < 0.001$).

In accordance with previously published studies [13–16], in our study, we found that the proportion of patients referred for OP workup after sustaining a fragility fracture is very low [11/70 patients (16%)]. It is clear that current common practice regarding the evaluation of OP after fragility fracture is insufficient. Such low numbers may have a few explanations. Foremost, there are no proper guidelines concerning the correct follow up and treatment of patients with fragility fractures; second, a fragility fracture patient is seen by numerous doctors and medical staff who may lack the necessary communication with one another; and third, physicians are not sufficiently aware of the possible association between OP and fragility fractures. By contrast, patients with a femoral neck fracture tend to experience a long hospitalization and consequently, are more likely to receive an explanation concerning the relationship between their fracture and OP. In the present study, our intervention addressed all these concerns.

A low-energy fracture is a signature event that signals the presence of a frail skeleton. Previous studies have shown that the risk of a second fracture (at any location) is two- to fourfold higher in patients who have suffered from a DRF [3–5,17]. Avoiding such

Table 2
Comparison between the two groups after the intervention.

	Control, $n = 35$	Intervention, $n = 35$	p
Visited their doctor	22.85 (8)	68.6 (24)	0.001
Undergone osteoporosis workup	14.28 (5)	40 (14)	0.001
Diagnosed with osteoporosis or osteopenia	5.71 (2)	17.1 (6)	0.041

Data are presented as % (number).

second fractures is important both for the patients and for the health care system, as it would result in reduced financial costs. Several studies have evaluated different methods to improve the detection rate of OP in patients who sustained fragility fractures. Rozentel et al [12] evaluated patients after DRF and compared the two interventions. These consisted of: (1) ordering a BMD examination and forwarding the results to the primary care physician by the orthopedic surgeon or (2) sending a letter to the primary care physician outlining guidelines for OP screening after a fragility fracture by the orthopedic surgeon. They found that ordering a BMD test by the orthopedic surgeon improved OP evaluation and treatment rates [12]. Improvement in the rate of patient being treated for OP was also demonstrated in a study by Majumdar et al [18] that faxed treatment guidelines for OP to the primary care physicians of women after wrist fractures. Conversely, Solomon et al [19] mailed educational material to adults aged over 65 years and found that this approach did not improve awareness of OP. Our intervention was found to increase the proportion of patients who turn to their physician to receive further information about OP from 22.9% to 68.6% and the proportion of patients undergoing a diagnostic examination for OP from 14.35% to 40% ($p < 0.001$).

A major key to improving OP management is to actively identify all patients at risk and proactively engage and encourage them to seek assessment and management [20]. A multimodal strategy involving a dedicated staff member and collaboration of the hospital staff with the primary care physician may offer the greatest potential for improving education and patient follow up and treatment. We believe that the success of our intervention in improving patient compliance could be attributed in part to the personal nature of the telephone call, giving the patient a sense of involvement, responsibility, and initiative of the hospital staff. We cannot conclude that sending the written materials alone would result in the same improvements in diagnosis and treatment.

We established in the first contact that only one woman received an explanation regarding the possible association between the fracture and OP from the attending doctor in the ER. Many patients reported that after being released from the hospital and despite possible implications of their injury, they wished to get back to their day-to-day activities and ignore the problem, choosing to put it aside. Based on the information collected in our study, we surmise that a direct conversation, which includes an explanation about necessary workup, initiated by a dedicated staff member during primary treatment in the ER, would increase a patient's compliance to undergo OP workup. Specifically, it would encourage patients to contact their physician and get referred for further workup. In line with this conclusion, Sander et al [21] report that employment of an OP coordinator to manage patients with fragility fractures is predicted to reduce the incidence of future hip fractures and save money.

The strengths of this study are its use of a randomized controlled trial approach, the use of multiple avenues for collating data and the versatile population (those visiting the ER of a public hospital) decreasing the potential for selection bias. The study had wide inclusion criteria indicating that the findings of this research will be broadly applicable. The intervention is a simple one to employ.

Table 1
Osteoporosis workup and diagnosis following the fracture in both groups.

	Control, $n = 35$	Intervention, $n = 35$	p
Doctor visit	22.85 (8)	17.14 (6)	0.557
Referred for osteoporosis workup	17.14 (6)	14.28 (5)	0.746
Undergone osteoporosis workup	14.28 (5)	11.42 (4)	0.725
Diagnosed with osteoporosis	5.71 (2)	5.71 (2)	1.00

Data are presented as % (number).

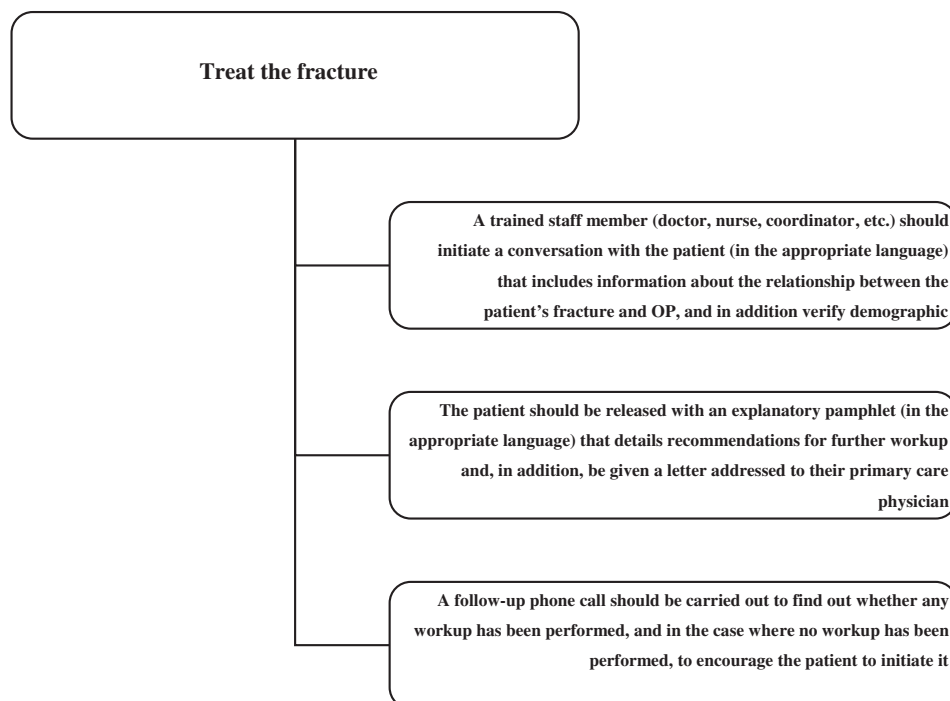


Fig. 2. Recommended approach for managing patients presenting at the emergency room with distal radius fractures. OP = osteoporosis.

Our study encountered few notable difficulties. First, incorrect demographic details were recorded for 13 patients (12.87%) in the computerized hospital system that prevented follow-up communications. Second, language barriers with some of the patients restricted communication and may have altered the results. The control group was not contacted again after 6 weeks to examine whether the time passed had an effect on OP workup and diagnosis rate.

Based on our study, in Fig. 2 we recommend an approach for managing patients presenting at the ER with DRFs.

In conclusion, relatively few patients undergo workup for OP after a DRF. Women with DRFs, who receive an explanation about possible OP implications and their primary care physician are sent explanatory materials, are more likely to undergo OP workup and receive preventive treatment when needed. A multimodal strategy involving a dedicated staff member and collaboration with the primary care physician may offer the greatest potential for improving education and patient follow up and treatment.

Conflicts of interest

The authors declare that they have no conflicts of interest.

References

- [1] Andrade SE, Majumdar SR, Chan KA, Buist DS, Go AS, Goodman M, et al. Low frequency of treatment of osteoporosis among postmenopausal women following a fracture. *Arch Intern Med* 2003;163:2052–7.
- [2] Canalis E, Giustina A, Bilezikian JP. Mechanisms of anabolic therapies for osteoporosis. *N Engl J Med* 2007;357:905–16.
- [3] Mallmin H, Ljunghall S, Persson I, Naessén T, Krusemo UB, Bergström 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;52:269–72.
- [4] Lauritzen JB, Schwarz P, McNair P, Lund B, Transbøl I. Radial and humeral fractures as predictors of subsequent hip, radial or humeral fractures in women, and their seasonal variation. *Osteoporos Int* 1993;3:133–7.
- [5] Cuddihy MT, Gabriel SE, Crowson CS, O'Fallon WM, Melton 3rd LJ. Forearm fractures as predictors of subsequent osteoporotic fractures. *Osteoporos Int* 1999;9:469–75.
- [6] Earnshaw SA, Cawte SA, Worley A, Hosking DJ. Colles' fracture of the wrist as an indicator of underlying osteoporosis in postmenopausal women: a prospective study of bone mineral density and bone turnover rate. *Osteoporos Int* 1998;8:53–60.
- [7] Wigderowitz CA, Rowley DI, Mole PA, Paterson CR, Abel EW. Bone mineral density of the radius in patients with Colles' fracture. *J Bone Joint Surg Br* 2000;82:87–9.
- [8] Rosen CJ. Clinical practice. Postmenopausal osteoporosis. *N Engl J Med* 2005;353:595–603.
- [9] Castel H, Bonneh DY, Sherf M, Liel Y. Awareness of osteoporosis and compliance with management guidelines in patients with newly diagnosed low-impact fractures. *Osteoporos Int* 2001;12:559–64.
- [10] Beringer TRO. A study of bone mineral density in woman with forearm fracture in Northern Ireland. Nyon, Switzerland: International Osteoporosis Foundation; 2004.
- [11] Handoll HH, Madhok R. From evidence to best practice in the management of fractures of the distal radius in adults: working towards a research agenda. *BMC Musculoskelet Disord* 2003;4:27.
- [12] Rozental TD, Makhni EC, Day CS, Bouxsein ML. Improving evaluation and treatment for osteoporosis following distal radial fractures. A prospective randomized intervention. *J Bone Joint Surg Am* 2008;90:953–61.
- [13] Smith MD, Ross W, Ahern MJ. Missing a therapeutic window of opportunity: an audit of patients attending a tertiary teaching hospital with potentially osteoporotic hip and wrist fractures. *J Rheumatol* 2001;28:2504–8.
- [14] Torgerson DJ, Dolan P. Prescribing by general practitioners after an osteoporotic fracture. *Ann Rheum Dis* 1998;57:378–9.
- [15] Freedman KB, Kaplan FS, Bilker WB, Strom BL, Lowe RA. Treatment of osteoporosis: are physicians missing an opportunity? *J Bone Joint Surg Am* 2000;82:1063–70.
- [16] American Orthopaedic Association. Leadership in orthopaedics: taking a stand to own the bone. American Orthopaedic Association position paper. *J Bone Joint Surg Am* 2005;87:1389–91.
- [17] Bogoch ER, Elliot-Gibson V, Beaton DE, Jamal SA, Josse RG, Murray TM. Effective initiation of osteoporosis diagnosis and treatment for patients with a fragility fracture in an orthopaedic environment. *J Bone Joint Surg Am* 2006;88:25–34.
- [18] Majumdar SR, Rowe BH, Folk D, Johnson JA, Holroyd BH, Morrish DW, et al. A controlled trial to increase detection and treatment of osteoporosis in older patients with a wrist fracture. *Ann Intern Med* 2004;141:366–73.
- [19] Solomon DH, Finkelstein JS, Polinski JM, Arnold M, Licari A, Cabral D, et al. A randomized controlled trial of mailed osteoporosis education to older adults. *Osteoporos Int* 2006;17:760–7.
- [20] Inderjeeth CA, Glennon DA, Poland KE, Ingram KV, Prince RL, Van VR, et al. A multimodal intervention to improve fragility fracture management in patients presenting to emergency departments. *Med J Aust* 2010;193:149–53.
- [21] Sander B, Elliot-Gibson V, Beaton DE, Bogoch ER, Maetzel A. A coordinator program in post-fracture osteoporosis management improves outcomes and saves costs. *J Bone Joint Surg Am* 2008;90:1197–205.