

# Investigation and treatment of osteoporosis in patients with fragility fractures

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## Abstract

**Background:** Many patients who have undiagnosed osteoporosis and a recent fragility fracture present to fracture clinics in Canadian hospitals, where the focus of management is on fracture care. The rate of diagnosis and treatment of osteoporosis in this patient group is unknown.

**Methods:** Patients who presented with fractures at sites consistent with fragility-type fractures were identified through a retrospective chart review of fracture clinic visits in 3 Ontario community hospitals in selected weeks in February and November 1996 and August and May 1997. These patients were contacted by mail and telephone follow-up to obtain consent to participate in a telephone interview. Patients were excluded if the index fracture had been traumatic, if they were younger than 18 years, or if they had medical conditions known to be associated with secondary bone loss. Eligible patients were questioned about their history of prior fractures, diagnosis of osteoporosis, and investigation and treatment of osteoporosis before or after the index fracture.

**Results:** Among 2694 fracture clinic visits, we identified 228 patients (8.4%) with fragility-type fractures. Of the 228, 128 (56.1%) were contacted and agreed to participate in an interview about 1 year from the date of the index fracture. Of the 128 patients, 108 (83 postmenopausal and 13 premenopausal women and 12 men) were confirmed as eligible. Of the 108, 43 had experienced 53 fractures in addition to the index fracture in the preceding 10 years, of which 71% were of the fragility type. At interview, only 20 (18.5%) (all postmenopausal women) of the 108 patients reported that they had received a diagnosis of osteoporosis. Of the 20, 90% and 45% respectively had been advised to take calcium and vitamin D supplements; 8 (40%) were receiving hormone replacement therapy (HRT), and 8 (40%) were taking bisphosphonates. Of the 88 patients who had not received a diagnosis of osteoporosis, 4 (4.5%) were receiving HRT, none was taking bisphosphonates, and less than 20% had been advised to take supplemental calcium or vitamin D.

**Interpretation:** In a representative sample of patients at urban fracture clinics, less than 20% who presented with a fragility-type fracture had undergone investigation and adequate treatment of osteoporosis at 1-year follow-up. Since previous fracture significantly increases the risk for future fracture, this clearly is a deficiency in management. Through improved identification and treatment of patients with osteoporosis-related fractures who present to fracture clinics, there is a significant opportunity to reduce the rates of illness and death associated with this condition.

Osteoporosis produces no symptoms until a fracture occurs, and the disease may not be detected early. Despite screening efforts, it is likely that many patients will continue to present, with the disease undiagnosed and untreated, to Canadian fracture clinics with osteoporosis-related fragility fractures.<sup>1-8</sup> Treatment is especially important and valuable for this high-risk group, since the rate of clinically serious fractures of the hip and spine increases as much as 20-fold after the first fragility fracture.<sup>9-15</sup> Women with a wrist fracture are at increased risk for future hip fracture. The annual incidence of a second hip fracture (22 per 1000

## Research

## Recherche

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among women and 15 per 1000 among men) is much greater than the annual incidence of a first hip fracture in the general population (3.6 per 1000 and 1.6 per 1000 respectively).

The purpose of our study was to determine whether patients presenting to community hospital fracture clinics with fragility-type fractures receive investigation and treatment of osteoporosis.

## Methods

To identify patients with fragility-type fractures, we reviewed the fracture clinic records of all patients who attended the fracture clinics of 3 busy Ontario community hospitals during 4 one-week periods in February and November 1996 and August and May 1997.

Fragility-type fractures were defined as any fracture of the distal radius, proximal femur, vertebral body or proximal humerus<sup>6</sup> that had occurred with minimal trauma (no greater than the trauma that would be experienced with a fall on a level surface while walking or standing).

In addition, we collected information about the patients' demographic features, the mechanism of the fracture, prior diagnosis of osteoporosis, and investigations ordered and medications prescribed during the fracture clinic visit.

We reviewed the in-patient charts, emergency department and radiology reports, and consultation letters of this initial group of patients to exclude those who were less than 18 years of age and those with conditions known to be associated with secondary bone loss (myeloma, hyperparathyroidism, rheumatoid arthritis, Paget's disease, osteomalacia, long-term corticosteroid use or cancer chemotherapy) and those with traumatic fractures (Fig. 1). The remaining patients were contacted about 1 year after the date of the index fracture with a single mailing that contained a brief description of the study, a consent form and a stamped, addressed return envelope.

We conducted a telephone interview with the patients who consented to participate. We used a pretested standardized questionnaire, designed to elicit further information directly from the patient regarding the circumstances of the fracture, the details of fracture management and fracture healing, and any investigations or treatment prescribed for osteoporosis before or after the index fracture.

Approval was obtained from the research ethics review board of each of the 3 participating hospitals.

## Results

During the 4 periods studied there were 2694 unique patient visits to the 3 participating hospital fracture clinics (Table 1): 414 (15.4%) were for fractures at anatomical sites consistent with fragility-type fractures, as defined in the Methods. Most (77.3%) of the 414 fractures were of the distal radius (Table 1). A total of 71% of the fragility-type frac-

tures occurred during the winter and spring months, and 29% occurred in the summer and autumn months.

After ineligible patients were excluded, there were 228 pa-

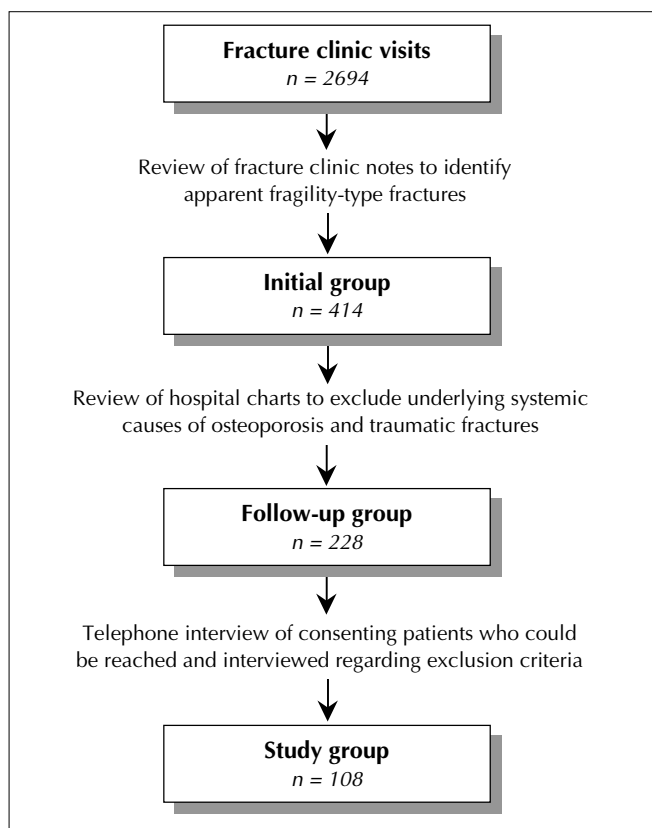


Fig. 1: Procedure used to identify eligible study participants.

Table 1: Distribution of all fractures at fragility sites (initial group) and fragility-type fractures\* (follow-up group) presenting to 3 Ontario community hospital fracture clinics in four 1-week periods in 1996 and 1997

Variable	Hospital; no. (and %) of fractures			
	A	B	C	Total
<b>Total no. of clinic visits</b>	524 (19.4)	1159 (43.0)	1011 (37.5)	2694
<b>Site of fracture</b>				
Distal radius				
Total at this site	70	132	118	320 (77.3)
Fragility-type fracture	40	68	57	165 (72.4)
Proximal humerus				
Total at this site	22	21	23	66 (15.9)
Fragility-type fracture	14	15	16	45 (19.7)
Proximal femur				
Total at this site	6	8	12	26 (6.3)
Fragility-type fracture	4	5	8	17 (7.5)
Vertebrae				
Total at this site	0	1	1	2 (0.5)
Fragility-type fracture	0	0	1	1 (0.4)
<b>Total</b>				
Total at fragility sites	98	162	154	414
Fragility-type fracture	58 (25.4)	88 (38.6)	82 (36.0)	228

\*Defined as fractures at the distal radius, proximal femur, vertebral body or proximal humerus that occurred with minimal or no trauma.

tients with fragility-type fractures; 128 (56.1%) were contacted by telephone and agreed to participate. Most of the remainder could not be reached, and a small number declined to participate. Of the 128 patients who consented to participate, 20 were excluded based on their interviews. Of the 108 remaining patients, 96 (88.9%) were women (83 postmenopausal and 13 premenopausal) and 12 were men. The mean age of both the women and the men was 64 years. Among the postmenopausal women, the average interval since the onset of menopause was 22 years. The average age at onset of menopause was 46 years (range 24–58 years).

Of the 108 patients, 43 (39.8%) reported that they had experienced a total of 53 fractures (other than the index fracture) in the 10 years preceding the index fracture, 81.1% (43/53) of which were of the fragility type, including 5 hip and 4 vertebral fractures. Three patients had incurred 3 additional fractures in the time since the index fracture.

A total of 38 (35.2%) of the 108 patients reported that they had previously undergone bone densitometry; 37 of the 38 were women. Of the 38 patients, 14 had the bone densitometry before, and 24 after, the index fracture (Table 2). Of the 24 patients referred for densitometry after the index fracture, 15 were referred by their primary care physician, 4 by the orthopedic surgeon and 5 by other specialists (gynecologist, rheumatologist or general internist).

Ten (9.2%) of the 108 patients had received the diagnosis of osteoporosis before the index fracture, and 10 received the diagnosis following bone densitometry, after the index fracture (Table 2). Thus, at the time of interview, osteoporosis had been diagnosed in 20 (18.5%) of the 108 patients, all of whom were postmenopausal women. Ten (50%) of the 20 patients reported having received the diagnosis from their primary care physician.

A total of 34 (35.4%) of the 96 women in the study group and 1 (8.3%) of the 12 men reported that they had

been advised at some point by their doctor to take supplemental calcium. Fourteen (14.6%) of the 96 women and none of the 12 men had been advised to take supplemental vitamin D.

Of the 83 postmenopausal women in the study, 8 had contraindications to the use of hormone replacement therapy (HRT), including a history of breast or uterine cancer or a clinical diagnosis of blood clots. Of the 75 remaining postmenopausal women, 27 (36.0%) had been offered HRT at some point for any reason. Of the 27, 15 had declined, and 12 (16.0% of 75) were taking HRT at the time of the interview; 8 of the 12 had a diagnosis of osteoporosis. Of the 20 subjects with a diagnosis of osteoporosis, 8 (40.0%) were taking bisphosphonates (alendronate in 5 cases and etidronate in 3) at the time of the interview.

## Interpretation

Fragility fractures, defined narrowly to include only those most likely to require osteoporosis treatment, accounted for a substantial proportion of all fracture clinic visits (8.4%) in our study. This finding suggests that the fracture clinic is an appropriate location to target interventions directed at increasing the investigation and treatment of osteoporosis.

The importance of fragility fractures as predictors of future fracture is supported by the proportion of study patients with a history of fracture before the index fracture (39.8%) and by the occurrence of 3 further fractures in the year between the index fracture and the follow-up interview. A total of 81.1% of the 53 fractures before the index fracture were of the fragility type. Of the 108 patients interviewed about 1 year after the index fragility-type fracture, only 18.5% had received a diagnosis of osteoporosis, and fewer were receiving adequate therapy. For more than one-quarter of these patients, the index fragility-type fracture was not the first. These findings demonstrate an important lost opportunity to build bone mass and reduce fracture risk in a large patient population.

Osteoporosis in men is common and is usually overlooked. In our study, 12 of the 108 study patients were men. The rate of densitometry after the index fracture was lower among the men than among the women, as was the rate of treatment.

Possible reasons for the low rates of investigation and treatment of osteoporosis among patients with fragility fractures include the large patient lists and rapid tempo of fracture clinics and a lack of consensus regarding who is responsible for osteoporosis care. We believe that it is a reasonable goal for the orthopedic surgeon to make both the patient and the family physician aware of the possibility of osteoporosis, to recommend calcium and vitamin D supplementation, and to suggest follow-up investigation and management by the primary care physician. Under some circumstances a referral to an osteoporosis expert could be considered.

**Table 2: Investigation and treatment of osteoporosis 1 year after index fragility fracture (study group)**

Investigation or treatment	No. (and %) of patients		
	Women <i>n</i> = 96	Men <i>n</i> = 12	Total <i>n</i> = 108
Bone densitometry			
Before index fracture	14 (14.6)	0	14 (13.0)
After index fracture	23 (24.0)	1 (8.3)	24 (22.2)
Diagnosis of osteoporosis	20 (20.8)	0	20 (18.5)
Prescribed calcium supplementation	34 (35.4)	1 (8.3)	35 (32.4)
Prescribed vitamin D supplementation	14 (14.6)	0	14 (13.0)
Taking bisphosphonates	8 (8.3)	0	8 (7.4)
Hormone replacement therapy in postmenopausal women with no contraindication			
Ever offered	27/75 (36.0)	–	
Currently taking	12/75 (16.0)	–	

Our study has several potential limitations. First, we studied physician practice patterns in only 3 Ontario community-based fracture clinics. The volume of these clinics was large, and all were in communities where both bone densitometry and medical expertise in osteoporosis were available. In communities where these resources are unavailable, there may be even lower levels of diagnosis and treatment. Second, we selected our follow-up group using a definition of a fragility fracture that included only cases with the highest probability of underlying osteoporosis. This may have resulted in underestimation of the problem, since some traumatic fractures at fragility fracture sites may occur in patients who have undiagnosed osteoporosis. Third, we evaluated physician management subsequent to the index fracture on the basis of patient report, which may not accurately reflect actual physician behaviour. Finally, although we identified 228 patients who met our criteria for fragility-type fractures, only 56% of these patients were interviewed at 1-year follow-up.

In summary, less than 20% of patients with fractures typical of osteoporosis treated in 3 Ontario community hospitals subsequently reported receiving appropriate investigation for and adequate treatment of osteoporosis. If, based on our findings, 8% of all fracture clinic visits are for fragility-type fractures, and assuming 10 000 annual fracture clinic visits, with 3 visits per fracture, we predict that as many as 250 osteoporosis-related fractures will present annually to each active fracture clinic; in 80% of these cases osteoporosis may remain undiagnosed and untreated up to 1 year after fracture. The potential to alter this pattern of practice represents a major public health opportunity. Specifically, orthopedic practitioners, associations and hospitals should consider how best to address this issue.

*Competing interests:* None declared.

*Contributors:* Dr. Hajcsar designed and performed the study, wrote the first draft of the article and participated in subsequent revisions. Dr. Hawker consulted on the study design and edited each revision. Dr. Bogoch conceived the study, consulted on the study design and edited each revision.

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