

# Follow-up for osteoporosis in older patients three years after a fracture

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## ABSTRACT

**Background:** Recently a Fracture and Osteoporosis outpatient clinic (FO clinic) was set up at the University Medical Centre Groningen (UMCG) with the aim to optimise case-finding of osteoporosis in older patients with a low-energy fracture. To provide a diagnostic setting before the start of our FO clinic, case-finding was carried out in patients who suffered an 'osteoporotic' fracture in the year prior to the foundation of the FO clinic. During a three years follow up project, osteoporotic patients who needed therapy were identified.

**Methods:** Patients aged  $\geq 50$  years who were seen in the UMCG for a low-energy fracture (shoulder, wrist or hip) one year before that period were asked to participate. The study was carried out in two parts – a telephone questionnaire and measurement of the bone mineral density (BMD). The data were compared with the results of the FO clinic.

**Results:** Of the 191 patients, 88 could be contacted and were analysed. Of these 88 patients only 12 had undergone additional investigations for the presence of osteoporosis in the year of the fracture, and only six patients were on antiosteoporosis medication; 45 patients had already suffered an earlier fracture and ten had a more recent subsequent fracture. Measurements three years after their fracture revealed that 55% of the 88 patients had osteoporosis (T-score less than -2.5 SD).

**Conclusion:** After a fracture, case-finding for osteoporosis is good clinical practice. In our study more than half of the patients were lost for follow-up after three years. But it is still worthwhile to check whether patients with fractures in the past had the necessary diagnostics and proper therapy. Comparing these results with those of the FO clinic, it is evident, however, that case-finding of osteoporosis after a fracture can be organised most effectively at the location where the patient first attends for treatment of the fracture, namely in the emergency department of the hospital.

## KEYWORDS

Osteoporosis, fracture, low energy, outpatient clinic, older patients

## INTRODUCTION

Osteoporosis is a systemic skeletal disease, characterised by low bone mass and a microarchitectural deterioration of bone tissue, leading to an increase in bone fragility and susceptibility to fracture.<sup>1</sup> The disorder often remains unnoticed up to the moment that a fracture occurs. Fractures of the hip, vertebrae and wrist are the most commonly occurring 'osteoporotic' fractures in the Netherlands and account for more than half of the total number of these fractures, estimated at more than 80,000 per year.<sup>2,3</sup> Fractures in bones affected by osteoporosis form a major health problem given the significant morbidity and mortality rates and the high socioeconomic costs.<sup>2,4,5</sup> Treatment costs are currently estimated to be more than € 300 million a year.

In our country we have guidelines for the prevention, diagnosis and treatment of osteoporosis. The Second Revised Guideline on Osteoporosis from the Dutch Institute for Healthcare Improvement, CBO, was published in 2002.<sup>2,6</sup> The recommendation was made that additional investigations should take place for patients with clear risk factors for osteoporosis, described in the guidelines as case-finding. Despite the existence of guidelines, including international ones, investigation for osteoporosis in older patients suffering from a fracture as a result of a low-energy injury does not always take place. The percentage of patients sustaining an osteoporotic fracture that are investigated for the presence of, or receive treatment for, osteoporosis currently varies between 10 and 25%.<sup>7-9</sup> In large clinical trials it has been proven that suitable medication can reduce the risk of a subsequent fracture by

more than half.<sup>10-12</sup> This underlines even more the necessity to look actively for osteoporosis.

A Fracture and Osteoporosis outpatient clinic (FO clinic) was set up at the University Medical Centre Groningen (UMCG) in 2003 in response to the above-mentioned CBO guideline with the aim to optimise case-finding of osteoporosis in patients aged  $\geq 50$  years with a fracture.

In order to determine to what extent case-finding of osteoporosis took place before the establishment of this FO clinic, all patients aged  $\geq 50$  years, who visited the Emergency Department of the UMCG the year before because of a low-energy fracture of the humerus, wrist or hip, were invited to take part in this investigation for the presence and treatment of osteoporosis. The aim of this study is to make an inventory of the fracture history and other risk factors and to analyse the extent of first-line case-finding and treatment of osteoporosis in the pre-FO era and the following three years. Bone mineral density (BMD) was determined three years after follow-up and treatment was started if necessary. Data were also compared with the first results from the FO clinic, as published in the *Nederlands Tijdschrift voor Geneeskunde*.<sup>13</sup>

## MATERIALS AND METHODS

Patients aged  $\geq 50$  years who were treated in the UMCG in 2001 for a subcapital humeral, distal radial or intracapsular hip fracture (= the index fractures) as a result of a low-energy injury were identified in the trauma database of the UMCG using the International Classification of Diseases (ICD9 codes 8134\*, 8120\* and 8200\*/82020/82080). Data concerning the type of fracture and the treatment given were obtained from the medical file.

The study was carried out in two parts – a questionnaire by telephone and a BMD measurement by means of dual energy X-ray absorptiometry (DEXA). The questionnaire included questions about the nature and circumstances of the accident and presence of relevant risk factors for osteoporosis as mentioned in the CBO guideline (*table 2*). The questionnaire also asked whether the fracture had resulted in an investigation of any possible underlying causes, who had taken the initiative for any such investigation and whether this was followed by further treatment.

A total of 273 patients were identified. At the time of the study (October 2003 – June 2004) 191 patients could be contacted by means of a written invitation to take part in the study (45 patients had died, 5 could not be traced, 5 lived outside the region and 27 did not react to the invitation). Of these 191 patients, 103 declined to take part in the study for a variety of reasons: no interest (38), already being treated for osteoporosis (12), in too poor a physical condition (35)

or other reasons (18). Eventually, it was possible to carry out the analysis for 88 patients. The average age of the group of patients who declined to take part in the study was significantly higher than that of the population that was investigated (74 and 65 years, respectively). This selection may have resulted in an underestimation of the prevalence of osteoporosis being found, since apparently only the younger patients took part in the study.

The BMD at the lumbar vertebrae, the hip and the distal radius was measured for all 88 patients by means of a DEXA scan (Hologic QDR Delphi-C 70141). The BMD measured was expressed as a T-score.<sup>14,15</sup> A T-score of  $-2.0$  SD or less at one of the positions measured together with a fracture was regarded as the treatment threshold.<sup>13</sup>

Statistical analysis was carried out using SPSS 10.0.7 for Windows. The protocol was submitted to the Medical Ethics Review Committee of the UMCG, who decided that the protocol did not fall under the scope of the laws regarding research in human subjects.

## RESULTS

The general data of the patients are set out in *table 1* and the results of the telephone questionnaire in *table 2*. At the time of suffering the index fracture in 2001 all of the patients had at least one risk factor for osteoporosis: a low-energy fracture occurred after their 50th year (*table 2*). There was a positive family history (mother with a hip fracture) in 12 cases (14%), 6 patients (7%) had an osteoporotic vertebral fracture, 16 (18%) had a low body weight ( $< 67$  kg) and in 13 cases (15%) serious immobility played a part. Only one patient (1%) had long-term usage of more than 7.5 mg of prednisolone a day.

Of the 88 patients investigated, 45 had suffered a fracture prior to the index fracture in 2001 (*table 3*). Six patients were on calcium supplements ( $n=4$ ) or bisphosphonates ( $n=2$ ) before. Answers from the questionnaire indicated that osteoporosis had been confirmed in 12 patients (9.2%) in the group of 103 non-participating patients.

A DEXA was performed in 12 patients (14%) as response to the index fracture and in seven cases a low BMD was found. These and three other patients were referred to the department of internal medicine for further investigation and treatment. Six patients were prescribed calcium supplements, three patients vitamin D and one patient bisphosphonate. The initiative for further treatment had been taken equally by the surgeon, internist/rheumatologist and general practitioner (4, 3 and 3 times respectively).

Ten of the 88 patients (11%) who had not received further treatment were seen later on in the emergency department with a new low-energy fracture (wrist  $n=4$ , femur  $n=2$ , ankle  $n=2$ , humerus  $n=2$ ). BMD analysis showed that in eight of these the T-score was less than  $-2.0$  SD.

**Table 1.** Patients characteristics (n = 88); averages with standard deviation (SD)

Male : female	19 : 69
Age at date of index fracture (years)	65 (range 50-82)
Age at date of DEXA scan (years)	68 (range 53-85)
Height (m)	1.68 (SD 9.6; range 1.48-1.96)
Weight (kg)	77 (SD 12; range 50-110)
Body mass index	27.2 (SD 3.7; range 19.1-39.7)
Fracture site (number)	
• Proximal humerus	22
• Distal radius	50
• Hip	16
Conservative : operative treatment	53 : 35

After the three years of follow-up severe osteoporosis was found in 55% of the patients (WHO definition). With a BMD T-score treatment cut off of -2.0 SD, this was 69%. A normal bone density was found in 19% (table 4).

## DISCUSSION

A fracture as a result of a low-energy injury in an older patient has long been identified as a risk factor for osteoporosis. In spite of this, our investigation shows that in three years only 14% of the patients were evaluated for osteoporosis in response to the index fracture. This is in accordance with the literature.<sup>7,9</sup>

The multidisciplinary approach in an FO clinic with the trauma surgeon as the starting point and an FO nurse practitioner as process manager, results in 75% of the patients at risk being investigated for the presence of osteoporosis and if necessary undergoing treatment.<sup>13</sup> The expectation is that this percentage will increase further by optimisation of the logistical process.

Our analysis of non-FO-patients three years after fracture shows that 55% have severe osteoporosis (fracture and T-score of -2.5 SD or less) while a total of 69% need to be treated with bisphosphonates. This percentage is comparable with the BMD data from our and other FO clinics.<sup>8,13</sup> In our opinion our results emphasise that an active approach towards case-finding of osteoporosis is urgently needed.

Questions can be raised as to whether this study with a relatively high percentage of non-participants can be compared with the results from the FO clinic. But the fact that the percentage of patients with manifest osteoporosis in both patient populations was equal may justify this assumption.

Of the 191 patients who were contacted, 103 could not participate. As they returned the answer card not all data

**Table 2.** Results of telephone questionnaire (n=88), numbers are presented

Risk factors	
• Fracture after 50th year	88
• Positive family history	12
• Existing vertebral fracture	6
• Low body weight (<67 kg)	16
• Serious impaired mobility	13
• Use of corticosteroids	1
Number of risk factors per patient	
• 1	47
• 2	36
• 3	4
• 4	1
Medication at time of index fracture	
• Calcium	4
• Vitamin D	0
• Bisphosphonates	2
Medication started as result of index fracture	
• Calcium	6
• Vitamin D	3
• Bisphosphonates	1
Additional treatment	
• DEXA scan after fracture	12
• Consultation with internist	9
Specialist who initiated further investigations	
• Surgeon	4
• Internist /rheumatologist	3
• General practitioner	3
Previous fractures (number of patients)	45
Subsequent fractures (number of patients)	10

**Table 3.** Fractures suffered before the index fracture in 2001 (57 fractures in 45 patients)

Lower arm (proximal from wrist)	8
Wrist	22
Hand	5
Hip	3
Lower extremity (distal from hip)	13
Other sites	6

**Note:** 9 patients had had more than one fracture before 2001; 10 patients had another fracture after 2001, 7 of these had also had a fracture before 2001 (1 refracture of the wrist, 1 refracture of the ankle, the others were at new sites).

**Table 4.** Bone mineral density (BMD) in the group investigated (n = 88)

T < -2.5 SD (osteoporosis)	48	55%
-2.5 SD > T < -1.0 SD (osteopenia)	30	34%
Normal bone density	10	11%
T < -2 SD (treatment cut-off)	61	69%

from these patients were lost to the study. The average age of the non-participating patients was nine years older. This may imply that older patients, once they are out of clinical follow-up, are not interested or are not able to take part because of their age and comorbidity. Nevertheless, this large group of patients also deserves a tailored treatment immediately after they have suffered a fracture. The

percentage of osteoporosis in this group of patients can be expected to be even higher.

In the population investigated ten of the 88 patients (11.4%) suffered a subsequent fracture within three years, eight of them with osteoporosis. With bisphosphonates a relative fracture risk reduction of more than 50% can be achieved within one year. This means that one could speculate that a subsequent fracture could have been prevented in five of these ten patients.<sup>10-12</sup> This percentage of refracture agrees with the percentage found by Van Helden *et al.* in a recently published study.<sup>16</sup> They investigated a large number of patients (n=806) aged  $\geq 50$  years who suffered a fracture in 2000 as a result of a low-energy injury. One or more new fractures were found within a follow-up period of two to four years in 11.1% of the patients.

Although some kind of therapy was started at the time as a result of the former BMD measurements for ten of the 88 patients, only one was prescribed bisphosphonate. Even if the proper investigations had been initiated, they were generally not followed by effective treatment according to the guidelines.

The aim of this study was to obtain an impression of the extent of case-finding for osteoporosis. Our conclusion is that many fracture patients with underlying osteoporosis were unnoticed. Early treatment of osteoporosis results in a relative fracture risk reduction of more than 50% after just one year. According to good clinical practice, there is an urgent need for patients with low-energy fractures to be followed by case-finding for osteoporosis and subsequent treatment. Comparison with the first results from the FO clinic of the UMCG clearly shows that in patients aged  $\geq 50$  years, suffering a fracture is one of the most important moments for the start of an effective detection of osteoporosis. It is in the spirit of the existing modern guidelines. This initiative can best be taken at the location where the patient attends for treatment of the fracture, namely the emergency department in the hospital.

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