Secondary prevention of fragility fractures: are we following the guidelines? Closing the audit loop

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ABSTRACT

INTRODUCTION The aim of this study was to determine whether orthopaedic surgeons follow the British Orthopaedic Association (BOA) guidelines for secondary prevention of fragility fractures.

PATIENTS AND METHODS A retrospective audit was conducted on patients with neck of femur fractures treated in our hospital between October and November 2003. A re-audit was conducted during the period August to October 2004.

RESULTS There were 27 patients in the initial study period. Twenty-six patients (96%) had full blood count measured with LFT and bone-profile measured in 18 patients (66%). Only nine patients (30%) had treatment for osteoporosis (calcium and vitamin D). Only one patient was referred for DEXA scan. Steps were taken in the form of creating better awareness among the junior doctors and nurse practitioners of the BOA guidelines. In patients above 80 years of age, it was decided to use abbreviated mental score above 7 as a clinical criteria for DEXA referral. A hospital protocol based on BOA guidelines was made. A re-audit was conducted during the period August to October 2004. There were 37 patients. All had their full blood count and renal profile checked (100%). The bone-profile was measured in 28 (75.7%) and LFT in 34 (91.9%) patients. Twenty-four patients (65%) received treatment in the form of calcium + vitamin D (20) and bisphosphonate (4). DEXA-scan referral was not indicated in 14 patients as 4 were already on bisphosphonates and for 10 patients their abbreviated mental score was less than 7. Among the remaining 23 patients, 9 patients (40%) were referred for DEXA scan. This improvement is statistically significant ($P = 0.03$, chi square test).

DISCUSSION AND CONCLUSIONS The re-audit shows that, although there is an improvement in the situation, we are still below the standards of secondary prevention of fragility fractures with 60% of femoral fragility fracture patients not being referred for DEXA scan. A pathway lead by a fracture liaison nurse dedicated to osteoporotic fracture patients should improve the situation.

KEYWORDS

Osteoporosis – Secondary prevention – Guidelines

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Osteoporotic fractures are becoming a major cause of morbidity and mortality across the world. In the UK, over 3 million people suffer from osteoporosis and some one has a fracture due to osteoporosis every 3 minutes.¹ In the UK, the disorder results in over 200,000 fractures each year, causing severe pain and disability to individual patients at an annual cost to the National Health Service of over £940 million.² There are also reports showing an estimated current cost to the NHS of osteoporosis and osteoporotic fractures as about £2 billion per annum.^{3,5} The cumulative life-time risk for sustaining an osteoporotic fracture in adult women is 1 in 3 compared to 1 in 12 in an adult male.^{2,5} The problems due to osteoporosis are likely to worsen as the population over 60

years of age is predicted to increase by 50% and over 90 years is predicted to double in the coming 40 years.⁴

Patients who sustain an osteoporotic fracture are at increased risk of sustaining further osteoporotic fracture.^{3,5} Women who develop vertebral fracture have a 19.2% risk of further vertebral fracture within the first year of the fracture if untreated.⁶ Orthopaedic surgeons are often the first and only physician to see these fracture patients; hence, they have an important role in the secondary prevention of fragility fractures. In September 2003, the British Orthopaedic Association (BOA) published guidelines for orthopaedic surgeons to initiate measures for secondary prevention of fragility fractures in patients presenting with

both vertebral and non-vertebral fragility fracture.⁵ The 'orthopaedic responsibility' for non-vertebral (hip) fractures outlined in the BOA recommendations were:

1. All fragility fracture patients should receive advice on bone health, *e.g.* stop smoking, limit alcohol to 2 units per day, regular weight training exercise, adequate calcium and vitamin D intake.
2. Non-vertebral fragility fracture in patients above 60 years of age and who are not frail should be evaluated for osteoporosis by measurement of bone mineral density (BMD) by means of axial dual energy X-ray absorptiometry (DEXA). The oldest patients, such as hip-fracture patients over 80 years, have been identified as osteoporotic and a BMD measurement is not usually necessary, unless bisphosphonates are being considered.
3. Patients under 60 years of age do not require referral for DEXA unless risk factors are present.

We carried out an audit to determine whether the guidelines were being followed in the case of patients admitted with fracture neck of femur to an orthopaedic ward. We made a departmental protocol after the audit. A re-audit was conducted after implementing the protocol.

Patients and Methods

A retrospective audit of case notes, drug charts, discharge summary, DEXA referral form and laboratory results of patients admitted with hip fractures between 1 October and 30 November 2003 were reviewed. We looked at the blood investigations performed on these patients from the laboratory results. Analysis of drug charts was performed to find out whether these patients were started on treatment in the form of calcium and vitamin D₃ for osteoporosis. We also analysed the DEXA-scan referral system in our hospital to find out whether any of these patients have been referred for DEXA scanning. The result of this audit was presented in our hospital audit meeting and necessary recommendations were made. A similar re-audit was carried out in September to October 2004. The results of audit and re-audit were compared statistically using chi square test.

Results

There was a total of 27 patients (Table 1) in the first audit. All except one were treated surgically. Twenty-six patients (96%) had full blood count and renal profile checked. Liver function test (LFT) and bone profile were measured in 18 patients (66%). Only 9 patients (30%) were treated for osteoporosis (calcium and vitamin D) including patients who were already on calcium and vitamin D. Only one patient (4%) was referred for DEXA scan.

Table 1 Results of audit: October to November 2003

Total patients	27
Age range (years)	63–98
Full blood count and renal profile (<i>n</i> = 27)	26 (96%)
Liver and bone profile (<i>n</i> = 27)	18 (66%)
Treatment for osteoporosis (<i>n</i> = 27)	9 (33%)
Calcium and vitamin D	9 (33%)
DEXA-scan referral (<i>n</i> = 27)	1 (4%)

The recommendations following initial audit were:

1. To create awareness among the junior doctors and the nursing practitioners of the BOA guidelines.
2. To involve nurse practitioners in the investigation and treatment of osteoporosis under the guidance of the senior house officers.
3. To prepare a hospital protocol based on BOA guidelines.

A departmental protocol for secondary prevention of fragility fracture was prepared (Table 3). It was decided to refer all patients with fragility fractures of the hip, between 60–80 years, for evaluation of bone density by DEXA. In patients with fragility fracture of the hip in the age group above 80 years, the BOA guidelines suggest a clinical decision by the orthopaedic surgeons on whether the patient requires referral for DEXA scan. The reason for referring the patients for DEXA scan is to consider treatment of osteoporosis with bisphosphonates if the DEXA scan shows osteoporosis (T score < -2.5). Administration of bisphospho-

Table 2 Results of re-audit: September to October 2004

Total patients	37
Age range (years)	51–100
Full blood count and renal profile (<i>n</i> = 37)	37 (100%)
Liver profile (<i>n</i> = 37)	34 (91.9%)
Bone profile (<i>n</i> = 37)	28 (75.7%)
Treatment for osteoporosis (<i>n</i> = 37)	24 (65%)
Calcium and vitamin D	20 (54.1%)
Calcium, vitamin D and bisphosphonates	4 (10.9%)
DEXA-scan referral (<i>n</i> = 23)	9 (39.1%)

Table 3 Our hospital protocol for dealing with fragility fracture of femur**Recommendations for admissions with fractured neck of femur**

1. Checking, FBC, renal, bone and liver functions in all patients
2. All fragility fracture patients should receive advice on bone health
 - Stop smoking, limit alcohol (2 units per day)
 - Regular weight-bearing exercise
3. Adequate calcium (1 g) and vitamin D (800 mg) intake (Calcichew D3 Forte 1, twice a day)
4. Referral for DEXA in indicated cases

Indications for DEXA referral in patients with fragility related hip fractures

1. Patients under 60 years with low impact fractures and if risk factors (Table 5) are present
2. All patients aged between 60 and 80 years
3. Active patients above 80 years if bisphosphonates are considered. Abbreviated mental score should be more than 7

Table 4 Abbreviated mental score

Age

Time to nearest hour

An address, *e.g.* 28 Oxford Street, to be repeated by the patient at the end of the test

Year

Name of the hospital, residential institution or home address, depending on where the patient is situated

Recognition of two persons – for example, the doctor, nurse, relative, *etc.*

Date of birth

Year the First World War started

Name of present monarch

Count backwards from 20 to 1

- Each question carries one mark.
- A score of 6 or less suggests dementia.

nates is complicated, requiring the drug to be taken on an empty stomach. This is a problem especially in elderly, demented patients and who do not have a resident carer.⁷ It was decided to use a 10-point abbreviated mental scoring system in patients over 80 years (Table 4). All patients with a score of 7 or more were to be referred for DEXA scan and those with a score of less than 7 to be treated with calcium (1000 mg) and vitamin D (800 mg) only. A printed copy of the departmental protocol based on BOA guidelines with our modification using the abbreviated mental score was given to all orthopaedic consultants, junior doctors and nurse practitioners in our hospital (Table 3).

A re-audit was conducted to evaluate the change in practice after the implementation of the protocol (Table 2). Patients admitted following a fracture neck of femur in our hospital during the period 1 September to 31 October 2004 were included in the study. There were 39 patients of whom 2 died in the postoperative period due to medical problems and were excluded from the study (Table 3). All patients were treated surgically and had their full blood count and renal profile measured (100%). The bone profile was measured in 28 (75.7%) and liver profile in 34 (91.9%) patients. Twenty-four patients (65%) received treatment in the form of calcium + vitamin D (20) and bisphosphonate (4). The four patients who received bisphosphonates were on that

medication prior to the admission. Two were started on allendronate just prior to their fall and the other two had been on allendronate for more than a year following previous fractures. DEXA-scan referral was not indicated in 14 patients as 4 were already on bisphosphonates and 10 patients had an abbreviated mental score of less than 7. Among the remaining 23 patients, 9 patients (40%) were

Figure 1 .Difference in initiating treatment and DEXA-scan referral in patients with fragility fracture of femur before and after introducing British Orthopaedic Association guidelines.

Table 5 Risk factors for osteoporosis**Insufficiency fracture**

Colles > 40 years (active)
 Vertebral body
 Proximal femur (any active adult)
 Other

Hormonal

Early menopause
 Hysterectomy before 45 years
 Amenorrhoea > 6/12

Medical

Family history of osteoporotic fractures
 Recurrent falls
 Impaired vision
 Rheumatoid arthritis
 IDDM
 Hyperparathyroidism
 Hyperthyroidism
 Malabsorption
 Multiple sclerosis
 Renal disease
 Ankylosing spondylitis
 Osteogenesis imperfecta

Drugs

Steroids > 2.5 mg/day for 3/12 months
 Immunosuppressive drugs
 Anticonvulsive therapy (phenytoin,
 phenobarbitone, carbamazepine)
 Heparin

Life-style factors

Alcohol excess
 Smoking
 Poor diet
 Immobility

referred for DEXA scan. Among the 25 patients in the age group above 80 years, abbreviated mental score was indicated in 24 patients (one patient was already taking bisphosphonate after a DEXA following a previous fracture) and it was estimated only for 14 patients (58%).

The comparison of the re-audit with the previous audit showed an increase in DEXA-scan referral rate from 1 (4%; $n = 27$) to 9 (39.1%; $n = 23$; Fig. 1). This, on statistical analysis using a chi-square test, shows that the increase is significant ($P = 0.03$). The number of patients who received treatment for osteoporosis increased from 9 (33%; $n = 27$) to 24

(65%; $n = 37$; Fig. 1). This is also statistically significant ($P = 0.01$, chi-square test; Fig. 1).

Discussion

Hip fractures are the most expensive osteoporotic fracture to treat, comprising 87% of the total cost of all fragility fractures.⁸ The cost of treating a hip fracture is about £12,000 per patient.⁸ There is projected world-wide increase in hip fractures from 1.66 million in 1990 to 4.5 million by 2050.⁹ This large world-wide increase in osteoporotic fracture could cause severe financial disruption to the health system. Patients who have suffered one or more fragility fractures should be priority targets of investigation and treatment for osteoporosis.⁷ The treatment of patients who have sustained a fragility fracture has been shown to reduce subsequent risk of fragility fracture by up to 50%.^{1,2,10} The bisphosphonate studies show that risedronate is effective in reducing the incidence of hip,¹¹ spine¹² and peripheral fractures.^{11–15} The basic investigation for a patient with fragility fracture includes assessment of risk factors for osteoporosis and falls and excluding a secondary cause of osteoporosis.² The estimation of bone mineral density is used to define osteoporosis using World Health Organization criteria,¹⁴ assess fracture risk¹⁵ and monitor treatment response.⁶ DEXA scanning costs only £45 per patient. There is evidence showing cost effectiveness of DEXA scanning and treatment of target groups when compared to untreated osteoporosis.^{16,17}

A busy trauma and orthopaedic unit focused on treating various emergency and elective trauma and orthopaedic problems is not expected to start definitive treatment for osteoporosis in the form of medications like bisphosphonates. Their role as an identifier of target patient has been well documented in the recent guidelines of the British Orthopaedic Association, National Osteoporosis Society and The Royal College of Physicians.^{1–5} Auditing of orthopaedic practice in the UK NHS during late 1990s has clearly shown missed opportunities in treating osteoporosis in patients attending orthopaedic clinics and being admitted as in-patients with various fragility fractures.^{18,19}

The British Orthopaedic Association published its 'blue book' with guidelines for orthopaedic surgeons for secondary prevention of fragility fracture in September 2003.⁵ Our audit in October–November 2003 of in-patients admitted with osteoporotic fractures of the hip revealed a lack awareness of BOA guidelines and failure to investigate and treat patients with fragility fracture by the orthopaedic team. The involvement of nurse practitioners in the orthopaedic ward along with better education of junior doctors showed an improvement in the results on re-audit in September–October 2004. The patients with fragility fractures who received treatment increased

from 33% to 65%. The percentage of patients referred for DEXA scanning increased from 4% to 39.1%.

The recent NICE guideline recommends bisphosphonates as the treatment option for: (i) secondary prevention of fragility fractures; (ii) women aged ≥ 75 years without the need for prior DEXA scanning; (iii) women aged 65–74 years in the presence of osteoporosis confirmed by DEXA scanning; and (iv) post-menopausal women < 65 years if they have very low bone mineral density (T score -3 or below) or if they have confirmed osteoporosis plus one or more additional age-independent risk factor.²⁰ This guideline also recommends Raloxifene as an alternative in elderly women who cannot comply with the regimen of bisphosphonates or cannot tolerate or who have had an abnormal response to bisphosphonates.²⁰ These new NICE guidelines supersede the BOA guidelines.

The re-audit shows that, although there is an improvement in the situation, we are still below the standards of secondary prevention of fragility fractures with 60% of femoral fragility fracture patients not being referred for DEXA scan. The possible reason is the lack of a care pathway. There is good evidence in the literature supporting the role of a fracture liaison nurse who is responsible for case finding, assessing, performing diagnostic evaluation (including axial DEXA), and making specific treatment recommendations for the secondary prevention of osteoporotic fractures.²¹ The BOA also suggests the need for a fracture liaison nurse who can work in the fracture clinic and in-patient wards.³ The abbreviated mental score, if used in patients over 80 years, is a useful tool to decide the need for a DEXA scan referral (Table 4). A system of continuous audit is necessary to bring an optimal outcome.

Conclusions

There is strong evidence demonstrating the magnitude of problems due to osteoporosis. The management includes case finding, investigation and medical treatment. The British Orthopaedic Association, National Osteoporosis Society and The Royal College of Physicians have given guidelines to deal with this situation. Orthopaedic surgeons need be more pro-active in highlighting at-risk patients and trust administrators are urged to provide more resources for the optimal functioning of the system to prevent further fractures. It would be worthwhile to carry out a cost-benefit analysis in a further study once the pathway is active.

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