



Compliance of an elderly hip fracture population with secondary preventative measures Efficacy of a simple clinical practice intervention

John STREET, Brian LENEHAN, Tony HIGGINS, David MULCAHY, George MULLAN

From Cork University Hospital, Wilton, Cork, Ireland

Secondary pharmaceutical measures are effective in all age groups for the prevention of osteoporotic fractures. This prospective study determines the demographics of 566 consecutive osteoporotic hip fractures presenting to a Level 1 Trauma Center. We examine the efficacy of simple treatment recommendations for pharmaceutical treatment of osteoporosis and the factors determining general practitioner and patient compliance with these recommendations in a community setting. One out of four patients (24.5%) had sustained a previous fragility fracture. Mean age was 80 years. Twenty five percent were resident in a nursing home and only 10% were taking anti-resorptive therapy preoperatively. In hospital mortality was 6%, and 39% of recruited patients were dead at 12 months. By this time more than half the survivors were resident in a nursing home. The compliance with anti-resorptive therapy had increased to over 70% consequent to our simple recommendations. Significant differences in GP and patient compliance were observed between nursing home and own residence dwellers. This study demonstrates the efficacy of a simple clinical practice intervention in increasing patient and GP compliance with secondary fracture prevention measures. We also discuss many of the confounding issues determining this compliance.

Keywords : osteoporosis ; hip fracture ; compliance ; prevention.

INTRODUCTION

Osteoporosis is a systemic skeletal disease characterised by progressive age-related loss of bone strength resulting in an increased risk of fracture sometimes with devastating consequences (5). According to the International Osteoporosis Foundation, every 30 seconds someone in the European Union sustains a fracture as a result of osteoporosis (5). Annual direct medical cost to treat 2.3 million osteoporotic fractures in Europe and in the United States of America come up to US\$ 27,000 million (10).

■ John Street PhD, FRCS(Orth), Senior Specialist Registrar.

■ Brian Lenehan, FRCSI, Senior Specialist Registrar.

■ Tony Higgins, FRCS(Orth), Senior Specialist Registrar.

■ David Mulcahy, FRCS(Orth), Consultant Orthopaedic Surgeon.

■ George Mullan, FRCS, Consultant Orthopaedic Surgeon.
Department of Trauma and Orthopaedics, Cork University Hospital, Wilton, Cork, Ireland.

Correspondence : Mr John Street, Department of Trauma and Orthopaedic Surgery, Cork University Hospital, Cork, Ireland. E-mail : hrb_street@yahoo.com.

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By the end of the current Bone and Joint Decade (2000-2010) the World Health Organisation predicts that 55% of post-menopausal women will have osteoporosis, as defined by fragility fracture and/or bone mineral density (10). The lifetime risk of a hip fracture among the European female population is in the order of 21% with a lifetime risk of sustaining any fragility fracture far greater at 40%. Fragility fractures are associated with increased mortality (9, 16) and significant morbidity and functional impairment (7, 17).

Hip fractures are common in the elderly, affecting 1 in 4 women by the age of 90 years and 1 in 8 men. These fractures have caused an "epidemic" during the last 20 years because the age specific rate for such fractures has doubled, and there has been a significant increase in the size of the elderly population in Europe. Hip fracture patients occupy a quarter of all orthopaedic beds, the treatment is costly and the rehabilitation slow (1).

In 1999 The World Health Organisation developed an extensive education and communication programme to increase the knowledge of bone physiology and osteoporosis, and to raise the awareness about major risk factors, prevention and management of the disease. Risk factors for the development of osteoporosis can be broadly stratified into non-modifiable and potentially modifiable. Amongst the potentially modifiable are the pharmaceutical agents used in the treatment of osteoporosis, including Calcium / Vitamin D and the bisphosphonates.

These secondary preventive measures (Calcium / Vitamin D analogues and bisphosphonates) have been shown to be effective, in numerous Type 1 studies, in all age groups, for the prevention of both hip and vertebral fracture (3). It would seem an effective strategy from a clinical, public health and health-economic point of view to emphasise secondary prevention in patients that have already sustained a fragility fracture, as the risk of sustaining a subsequent fracture is increased ten-fold (14). Similarly, with the very high morbidity and mortality associated with hip fracture, any reduction, regardless of the age of the patient at index fracture, will have significant public health benefit.

While numerous controlled trials have demonstrated the efficacy of calcium / vitamin D and/or bisphosphonates in secondary prevention of osteoporotic fracture, to our knowledge none has examined the efficacy of simple recommendations from a busy trauma unit and the factors determining general practitioner / patient compliance with this recommended treatment in a community setting.

The aims of this study were twofold. Firstly, to present demographic data on hip fractures in an elderly Irish population and compare this to the European-wide experience. Secondly, to examine the effect of a simple clinical practice intervention on patient and family doctor compliance with pharmaceutical secondary fracture prevention.

MATERIALS AND METHODS

In 2001, we began a prospective collection of data on all fractures treated at our institution using a custom designed computerised database (Filemaker Pro). All low energy / fragility hip fractures, in patients over the age of 65 years, were identified and after obtaining written consent from the patient or guardian the patients were entered into this study. Of 3000 consecutive fractures treated over an eighteen-month period, we identified 977 fragility fractures requiring operative management, 803 of which were in patients over the age of 65, and of which 566 were hip fractures. Relevant information retrieved from patients' general practitioners, carers and medical notes included patient demographics, history of previous fracture, domiciliary status and medications on admission.

In the case of each study patient, the family practitioner was informed on admission of the diagnosis of an osteoporotic / fragility hip fracture, and the purpose and nature of the study was discussed, including the anticipated role of the family doctor in the remainder of the study. On discharge from the acute hospital setting, a comprehensive clinical summary accompanied the patients and/or their carer, with a copy sent to the family doctor. Included was an explanatory leaflet outlining our simple recommendations.

As part of a larger study we recommended investigation by an appropriate internal physician (including bone densitometry) and appropriate therapy for all patients under 65 years of age. Specifically for the patients in this study (> 65 years of age) our recommendations were simple ; empirical commencement of a bisphosphonate and a Calcium/Vitamin D supplement if no absolute

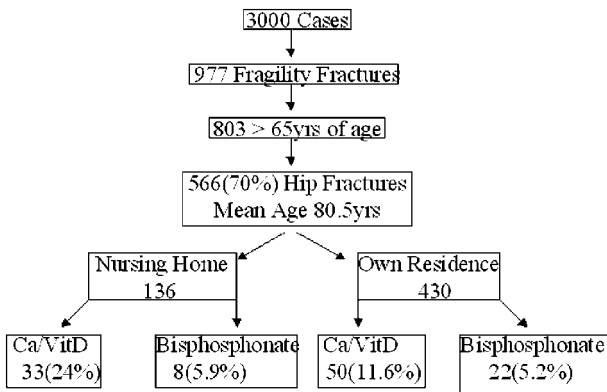


Fig. 1. — Flow-chart illustrating preoperative demographics and anti-resorptive therapy use in 566 patients with osteoporotic hip fractures.

contraindications exist. The choice of formulation of the medication was left to the family doctor.

Patients' carers and general practitioners were contacted by telephone and by postal questionnaire 12 months following the injury to determine survival / morbidity data and compliance with the use of anti-resorptive medication as recommended.

RESULTS

The mean age of this cohort of hip fractures (566 patients over the age of 65 years) was 80.5 +/- 7.5 years. Seventy five percent of patients were female.

One hundred and thirty nine patients (24.5%) had sustained a previously documented fragility fracture. Sixty one patients (10.7%) had a previous contralateral hip fracture, 107 (19%) had a previous wrist fracture, 77 (13.6%) had a previous vertebral fracture.

On admission to hospital, 24% (136 patients) of hip fracture patients were resident in a nursing home. Of this group (Nursing Home resident on admission) only 24% were taking a Calcium / Vit D analogue while only 5.9% were taking a bisphosphonate. Of those patients resident at home at the time of injury, only 11.6% and 5.2% were taking Calcium / Vit D and a bisphosphonate respectively. This is shown in figure 1.

The median time from admission to surgery was one calendar day with a range of 1 to 10 days. Fifty

seven percent of cases were performed outside Routine Trauma Lists (08:00-17:00 hrs).

Of the 566 hip fractures, 49% were intra-capsular and had a hemiarthroplasty performed (25% Uncemented Unipolar, 24% Cemented Bipolar). The remaining 51% had an intertrochanteric fracture and had either a traditional Dynamic Hip Screw or an Intramedullary Hip Screw inserted.

The mean length of stay in an acute hospital bed was 11.5 days with a further mean 16.5 days spent in a step down care facility. Only 8.14% of patients went directly home on discharge. The calculated in-patient mortality was 5.8%.

At 6 months the mortality rate was 28% and by 12-month follow-up only 61% of index patients were still alive. Of these survivors, 51% were now resident in a nursing home facility. The mortality and changes in domiciliary status one year following hip fracture are represented in figure 2 a and b.

At the final follow-up at 12 months, 72% of nursing home and 75% of 'own residence' dwellers were being prescribed the anti-resorptive medication (as recommended) by their family doctor. Of the nursing home patients receiving a prescription, 88% were prescribed Ca / Vit D and only 56% were prescribed a bisphosphonate. There was recorded 100% compliance with both of these prescriptions. Of the 'own residence' dwellers receiving a prescription only 67% were prescribed Ca / Vit D, while 80% were being prescribed a bisphosphonate. There was 92% compliance with the Ca / Vit D prescription and only 76% compliance with the bisphosphonate. Of these patients, living at home and prescribed (n = 134) but not taking (n = 32) a bisphosphonate, 26 of the 32 cited 'side-effects' e.g. reflux as the primary reason for non-compliance. This data is represented in figure 3.

DISCUSSION

In 1998 the European Commission released a "Report on Osteoporosis in the European Community – Action for Prevention". In this they made 8 broad recommendations aimed at making the prevention and management of osteoporosis and related fractures a health care priority in all Member States. In 2001 the International Osteoporosis

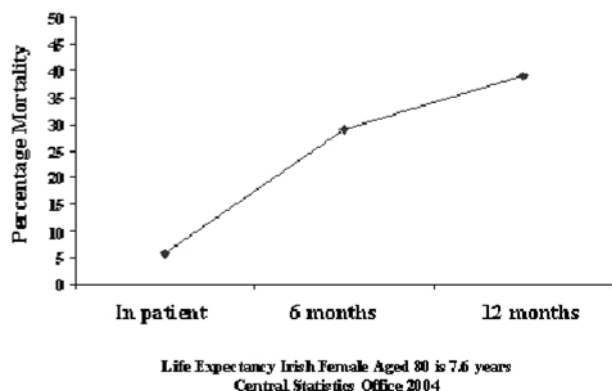


Fig. 2a. — Longitudinal mortality rate of patients > 65 years with an osteoporotic hip fracture.

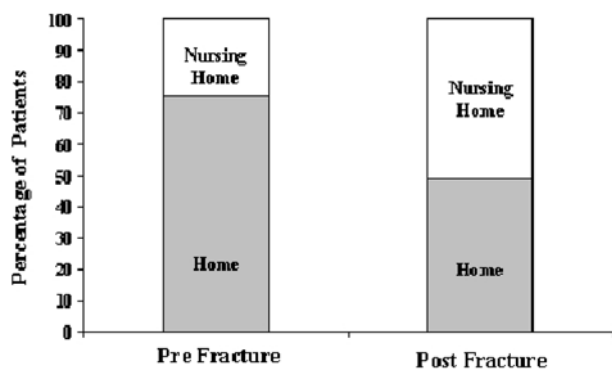


Fig. 2b. — Pre and postoperative domiciliary status of patients > 65 years with an osteoporotic hip fracture.

Foundation (IOF) reported on an audit which clearly showed that little progress had been made – governments were still not taking the steps necessary to prevent this growing epidemic of fractures.

A recent report from the European Parliament Osteoporosis Interest Group and European Union Osteoporosis Consultation Panel Meeting has highlighted the enormity of the problem facing us in the management of osteoporotic fractures, and in particular fractures of the hip. One in three women and one in five men over the age of 50 have sustained an osteoporotic fracture, and osteoporosis related fractures account for more days spent in hospital than many other diseases, including diabetes, myocardial infarction and breast cancer for women over 45 years of age.

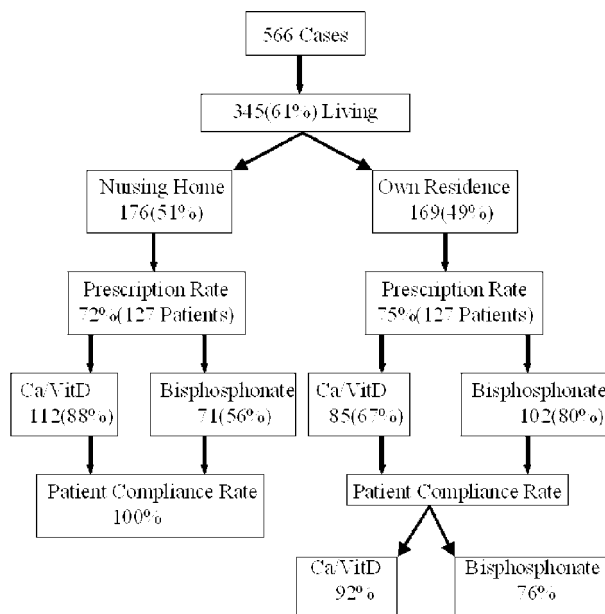


Fig. 3. — Flow chart illustrating 1-year postoperative demographics and antiresorptive therapy use in 345 surviving patients with osteoporotic hip fractures.

In 2000 the number of osteoporotic / fragility fractures in Europe was estimated at 3.79 million, of which 0.89 million were hip fractures (179, 000 hip fractures in men and 711, 000 in women). The total direct costs were estimated at € 31.7 billion which were expected to increase to € 76.7 billion in 2050 based on the expected changes in the demography of Europe.

Our epidemiological data, and that published from an equivalent Belgian academic Hospital, are clearly reflective of the data being presented by these international interest groups. In that Belgian study, Scheerlinck *et al* reported on 201 consecutive hip fractures in patients over the age of 50 registered according to the SAHFE (Standardised Audit of Hip Fractures in Europe) protocol. Their mean age was 81.3 years ; 75% were females, more than 40% were admitted from an institution and fewer than 10% were completely fit. They reported comparable outcomes with a 16% 4-month mortality and over 25% of previously independent patients being institutionalised following their injury (13).

In our study the six-month and 1-year mortality were 28 and 39% respectively. Consider this against data from the National Central Statistics Office whereby an Irish female aged 80 years has a life expectancy of 7.6 years. Even at this elderly age the 'years lost' due to osteoporotic hip fracture are significant. Similarly significant is the loss of independence, whereby the number of patients resident in a full-time care facility had more than doubled from 24 to 51%. These data reflect the enormous burden to the patient specifically and to society in general that such an injury brings.

In our study we intentionally identified the highest risk groups; the very elderly (mean age 80 yrs), high incidence of previous fragility fracture (24.6%), high risk of recurrent falls (24% nursing home resident), 1-year mortality rate of 39%. Unlike similar studies of an Irish population (6) we did not exclude males with hip fractures (25%) or those with cognitive impairment, two groups known to have poorer functional outcome and higher mortality. Despite such a 'high risk' group, and particularly when one in four had a previous fracture, the number of patients on any form of anti-resorptive agent at the time of admission was approximately 10%. This is not surprising when one considers the reports mentioned earlier (2, 4, 15).

It is worrying, therefore, that despite all this evidence the awareness and compliance with treatment of surgeons / physicians and their patients remain lacking. A survey of orthopaedic surgeons in Ireland in 2000 reported that less than 20% would institute or recommend investigation of the degree of osteoporosis in an elderly female with a fragility hip fracture. Of more concern was that only a similar number would recommend any secondary preventative measure such as Vit D / Calcium or a bisphosphonate (15). These findings are similar to those reported by Pal *et al* in a survey of orthopaedic surgeons in the UK (11). In their study of 3812 women Feldstein *et al* concluded that adherence to guidelines on osteoporosis had not improved from 1998 to 2001, despite the promulgation of evidence-based guidelines (4).

In a very important study Cuddihy *et al* (2) demonstrated that while referral for densitometry and liaison via the general practitioner, as recom-

mended by the National Osteoporosis Foundation guidelines, did increase the use of secondary preventative measures, the vast majority of 'high risk' patients did not comply with the interventions. Not only are physicians more inclined to recommend secondary prevention in the younger patient, but these younger patients themselves appear to be more aware of the benefits of intervention than their more elderly counterparts.

It is this group of elderly counterparts that we chose to focus on in our study. We felt that this is even more interesting considering the prevailing attitudes of elderly women to hip fracture and the associated loss of independence. Salkeld *et al* reported on 194 women > 75 years of age, and using the time trade off technique, found that 80% of women would rather be dead than experience the loss of independence and quality of life that results from a bad hip fracture and the subsequent admission to a nursing home (6, 12). Therefore, failure of the elderly to benefit from secondary prevention cannot simply be explained by lack of awareness or interest.

Our clinical practice intervention had a simple aim: to increase the use of secondary preventative measures in patients with osteoporotic fractures. Because our cohort did not exclude the cognitively impaired, we directed our efforts towards the general practitioners and those caring for the patients either at home or in long-term residential care. It was clearly successful in this regard. On admission to hospital 24% (136 patients) of hip fracture patients were resident in a nursing home. Of this group (Nursing Home resident on admission) only 24% were taking a Calcium / Vit D analogue while only 5.9% were taking a bisphosphonate. Of those patients resident at home at the time of injury, only 11.6% and 5.2% were taking Calcium / Vit D and a bisphosphonate respectively. GP adherence to the recommendations for treatment without densitometry in patients > 65 years was not influenced by patients' domiciliary status. Prescribing rate was 72% for nursing home residents and 75% for patients living at home. However when examined more closely, of the nursing home population 88% were prescribed vitamin D / calcium supplementation while only 56% were prescribed a

bisphosphonate. Of those living at home, only 67% were being prescribed vitamin D / calcium supplementation while 80% were prescribed a bisphosphonate.

Of concern also was the 13% of patients living at home, being prescribed a bisphosphonate and not vitamin D and calcium. We informed the GP's of this discrepancy, the independent efficacy of vitamin D / calcium supplementation and the theoretical risk of osteomalacia with long-term bisphosphonate use.

This report is one part of a larger study at our institution of osteoporotic fragility fracture prevention. We are also examining the efficacy of simple recommendations on a younger population (including DEXA scanning etc). We have found that GP / carer involvement is critical from the outset of the study. We are hoping to recruit a Nurse Practitioner whose purpose it would be to ensure that the database was up to date, to liaise with the GP's, carers and pharmacies. We are determined that our departmental strategy is developed to ensure optimum patient compliance and thus secondary fracture prevention.

Many previous reports have cited various success rates with implementation of secondary preventative measures. Most have shown that patients at risk are identifiable and that guidelines for investigation and recommendation are implementable. However this study examines not only the efficacy of a clinical practice intervention to increase GP awareness but it also illustrates the practical complexities of ensuring that the recommendations come to final fruition.

Osteoporosis prevention in a high-risk fracture population is important. Our study demonstrates that implementing a clinical intervention strategy that systematically formulates simple and clear recommendations to hip fracture patients, carers and their GP's, is an efficient way to promote prevention in a target group.

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