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Second hip fracture in elderly hip fracture patients: cost and effectiveness of fracture prevention treatment

SIR—Hip fractures account for about 10% of all fractures [1], increasing by 1–3% annually [2]. About 8% of these patients sustain repeat hip fracture within the first year [3]. The probability of sustaining two hip fractures in the course of an individual’s life could reach 20% [4]. Treatment with vitamin D and calcium supplements and improvement of vitamin D status play an important role in the osteoporosis therapeutic strategy and in the prevention of hip fractures in the elderly, decreasing the hip fracture rate by 30% in treated versus untreated patients [5]. Efficient fracture prevention treatment with alendronate has been reimbursed in Israel since January 2000.

We assessed standards of care, following an index hip fracture, and the rate of second hip fractures in elderly patients treated in the community clinics (community-treated patients: CTP) and compared it with the rate in the participants of a post-surgical osteoporosis treatment programme (PSOTP).

Participation in the PSOTP was offered to all elderly hip fracture patients who underwent surgical correction of hip fracture in the Department of Orthopaedic Surgery during 2001–2002. Frequent fallers, patients having major psychiatric problems, malnutrition or active malignant disease in the last 5 years and patients receiving bisphosphonates for established osteoporosis were excluded.

Methods

CTP group

Information about the first hip fracture, laboratory evaluation, concomitant diseases and medications was retrieved from the patients’ discharge charts. Two years after the index fracture, the CTP were contacted by a physician from the Metabolic Bone Diseases Unit. The patients were requested to bring to the phone all their current medications and to read their names to the interviewer. Questions about calcium and vitamin D doses were specifically stressed. The patients were asked about new fractures and about past and current use of antiresorbing drugs. All reported second hip fractures were validated by data retrieval from patients’ hospital charts.

PSOTP group

The PSOTP patients underwent quarterly clinical and laboratory evaluation. For details please see Appendix 1 in the supplementary data on the journal website (www.ageing.oxfordjournals.org). All the PSOTP patients were treated with 600mg of elemental calcium and 800IU of vitamin D3. Treatment with alendronate was started after therapeutic correction of vitamin deficiency (serum 25(OH)D3 ≥18 ng/ml).

Descriptive statistics were used to characterise the patients’ groups. Comparison in fracture rates was performed using Fisher’s exact test and the calculation of relative risk (RR) with 95% confidence interval (CI). To compare two groups, t-test or Mann–Whitney test (as appropriate) was used for continuous variables, and chi-squared test for categorical variables.

Results

Of 512 elderly hip fracture patients who met inclusion criteria, 97 (19%) consented to participate in the PSOTP and 415 (81%) were treated in their community medical care facilities. Two years after the index fracture, 29 (5.6%) were
lost to follow-up, 56 (11%) were deceased and 112 (22%) refused to participate in the telephone survey or were unable to give reliable information. The remaining 218 responders formed the CTP group.

No statistically significant differences were observed between the groups in demographic and clinical parameters (see Appendix 2 in the supplementary data).

Before the index fracture, all the patients were treated in their community clinics. Of these 315 patients (in both groups), one received treatment with alendronate (10 mg/day), calcium (1200 mg/day) and vitamin D (cholecalciferol) 400 IU/day. Four patients received calcium supplements (600 mg/day).

Ten (4.6%) of CTP and 18 (18.6%) of PSOTP participants reported clinical low trauma fractures before the index hip fracture; previous hip fractures: eight (3.7%) and one (1%) patients; wrist fractures: one (0.45%) and 10 (10.3%) patients reported 13 fractures; clinical vertebral fractures: one (0.45%) and three patients (3.1%) reported five vertebral fractures, respectively.

Five PSOTP patients (5.2%) had previous humerus fractures.

In the CTP group no patients reported more than one previous osteoporotic fracture. In the PSOTP group, eight (8.2%) patients had more than one previous osteoporotic fracture.

After surgical treatment for the index fracture and hospital discharge 117 (53.7%) of CTP did not receive any treatment for osteoporosis, 13 (5.9%) reported receiving alendronate, four (1.8%) raloxifene. Information about calcium and vitamin D supplementation is available as Appendix 3 in the supplementary data.

All of the patients enrolled in the PSOTP were treated with vitamin D (400–1400 IU) and calcium supplements (600–1200 mg) daily. At the time of the survey, alendronate was started in 41 (42.3%) patients after improving their vitamin D status. Seventeen (7.8%) patients in the CTP group (4 men, 13 women, mean age 80.87 ± 7.57) sustained a second osteoporotic fracture, which occurred 3–20 months after the index fracture. The mean time period between the fractures was 8.4 ± 4.4 months.

During 1 year after the index fracture 14 (16.4%) hip fractures occurred in the CTP group and one in PSOTP, P=0.044 (Table 1). For further information see Appendix 4 in the supplementary data.

The relative risk of second hip fracture was 6-fold higher in the CTP: RR = 6.23; 95% CI 0.83–46.71.

The approximate cost of fracture treatment is shown in Table 2.

### Discussion

Significant loss of bone mineral density and lean body mass that occurs shortly after hip fracture and continues throughout 1 year may lead to a new fracture [6]. Repeat fractures usually occur within a 4-year period [7]. Anti-osteoporosis treatment in these patients is not widely implemented [8], and a majority of the fracture patients do not receive appropriate treatment intervention after the fracture [9–11].

There is strong evidence of a decrease in hip fracture rates with calcium and vitamin D supplementation and with bisphosphonate treatment [5, 12, 13]. But in general practice physicians rarely evaluate such patients for osteoporosis and rarely prescribe calcium and vitamin D supplements and anti-osteoporotic medications that are available and reimbursed by the public health services [14]: only ~20% of senior hip fracture patients received treatment for osteoporosis [15]; only 24% of the patients who sustained an osteoporotic fracture underwent diagnostic evaluation or were treated for osteoporosis [16].

Inclusion of effective anti-osteoporosis treatment in the national list of reimbursable drugs has much lower impact on the prescription rate than had been expected [17]. After sustaining a low trauma fracture only 27% of patients accepted osteoporosis as a serious disease [18]. Patients’ adherence to the treatment with calcium and vita-

### Table 1. Time to the second symptomatic osteoporotic fracture in elderly hip fracture patients

<table>
<thead>
<tr>
<th>Fracture</th>
<th>CTP group</th>
<th>PSOTP group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 3 months</td>
<td>2 (hip)</td>
<td>1 (wrist)</td>
</tr>
<tr>
<td>Between 3 and 6 months</td>
<td>5 (hip)</td>
<td>1 (hip)</td>
</tr>
<tr>
<td>Between 6 and 9 months</td>
<td>4 (hip)</td>
<td>0</td>
</tr>
<tr>
<td>Between 9 and 12 months</td>
<td>4 (3 hip, 1 wrist)</td>
<td>0</td>
</tr>
<tr>
<td>After 12 months</td>
<td>2 (vertebral)</td>
<td>1 (hip)</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>3</td>
</tr>
</tbody>
</table>

### Table 2. Approximate cost of treatment, following index hip fracture, of CTP and PSOTP patients

<table>
<thead>
<tr>
<th>Fracture</th>
<th>CTP</th>
<th>PSOTP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost (in US$)</td>
<td>Number</td>
</tr>
<tr>
<td>Richard's nailing</td>
<td>3,330</td>
<td>12</td>
</tr>
<tr>
<td>Austin-Moore hemiarthroplasty</td>
<td>3,100</td>
<td>1</td>
</tr>
<tr>
<td>Total hip replacement</td>
<td>5,000</td>
<td>1</td>
</tr>
<tr>
<td>Hospitalisation; mean duration 12 ± 6.9 days</td>
<td>250 per day</td>
<td>183 bed/days</td>
</tr>
<tr>
<td>Rehabilitation in specialised institutions 14 days</td>
<td>5,500</td>
<td>16 cases</td>
</tr>
<tr>
<td>Treatment of the peripheral fracture in ER</td>
<td>150</td>
<td>1</td>
</tr>
<tr>
<td>Visit with fracture in primary care, X-ray included</td>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>Four outpatient clinic visits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active anti-osteoporosis treatment for one year per 100 patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cost in 2 years (approximately)</td>
<td>200 patients</td>
<td>182,120</td>
</tr>
<tr>
<td>Cost per 100 patients/ year</td>
<td>45,530</td>
<td>31,395</td>
</tr>
</tbody>
</table>

*Number of visits of CTP and the cost of medications used in the primary care setting were unavailable to us, so the total cost in this group is underestimated.
min D supplements is low, but can be increased from 24 to 71% through a special programme [19] (see Appendix 5, available as supplementary data). The secondary prevention of osteoporosis using such an approach, as well as ‘fracture liaison services’ [20] or ‘osteoporotic pathway’ [18] and educational programmes [21] represent real clinical options.

We would like to stress the fact that PSOTP patients had a higher reported rate of previous fractures before participation in the programme, but 1 year later the rate of second hip fracture was significantly lower in this group.

To the best of our knowledge, the current study is the first longitudinal observational study to be performed in elderly hip fracture patients who were discharged from the same department of orthopedic surgery, where a comparison between an outpatient clinic hospital treatment programme and community health services was performed.

Our study depicts a unique, real-life experiment in providing appropriate treatment to hip fracture patients. In contrast to clinical trials, where unusual attention is provided to the patients by specialised research staff, in our setting the patients were treated in an outpatient clinic on a quarterly basis, by the regular staff of the Metabolic Bone Diseases Unit. This low-cost intervention led to remarkable results when compared with the treatment provided in the community clinics.

The reasons for this outcome probably lie in the lack of knowledge of the patients, their families and primary care physicians about the absolute necessity of post-fracture medication therapy [22, 23]. Most of the efforts after surgical repair of the fracture are invested in physical rehabilitation and post-fracture recovery. Lack of encouragement by the busy community medical care system and occasional visiting of the patients were treated in an outpatient clinic on a quarterly basis, by the regular staff of the Metabolic Bone Diseases Unit. This low-cost intervention led to remarkable results when compared with the treatment provided in the community clinics.

In conclusion, the majority of elderly hip fracture patients do not receive appropriate treatment for osteoporosis within community medical services after hospital discharge; the rate of a second osteoporotic fracture shortly after the first one is high in these patients; participation in a post-surgical treatment programme allows a significant decrease in the high rate of second fracture.

Key points
• The majority of elderly hip fracture patients do not receive appropriate anti-osteooporosis treatment in community medical services after their hospital discharge.
• The rate of repeat hip fracture in community clinic treated patients was significantly higher compared with the rate among participants in a specially designed hospital outpatient clinic osteoporosis treatment programme.

The cost of treatment due to repeat hip fractures per 100 patients per year is higher in the community-treated patients compared with the programme participants.

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Colonoscopy in the very elderly is safe and worthwhile

SIR—Colonoscopy is a commonly performed, invasive procedure that allows direct visualisation of the mucosal surface and serves as a therapeutic tool. Colonoscopy is generally well tolerated, but complications are recognised [1, 2]. Advancing age is commonly assumed to be an independent risk factor [3, 4] and hence accounts for the reluctance of some physicians to use colonoscopy to evaluate patients beyond 80 years of age.

We reviewed our colonoscopy experience in the very elderly (80 years of age or over) over a 6-year period.

Patients and methods

A total of 3,106 colonoscopies were performed in our unit between September 1996 and July 2002. Both inpatients and outpatients were included. Of these procedures, 247 (8%) were performed on 225 patients aged 80 years or over. The majority within this subset were women (male:female = 96:129) and the mean age was 83.4 years (range 80–93.5 years).

Colonoscopy was performed using Olympus colonoscopes (CF 240 AL and CF 200 HL, KeyMed Ltd, Southend-on-Sea, UK). Oxygen was delivered using nasal cannulae and oxygen saturation monitored with finger oximeters.

Endoscopic data were collected prospectively and stored in a computer database (Endoscribe). Data were exported to Microsoft Excel 97 spreadsheet software for further analysis.

Results

The main indication for colonoscopy was anaemia (Table 1). Other indications included a change in bowel habit, haematochezia, abnormal barium enemas and cancer surveillance. Bowel preparation was as per our unit’s standard protocol. Two sachets of Picolax were used in the majority (137/247 patients), with light diet 2 days before the procedure and clear fluids 1 day before. Other forms of preparation included the use of Fleet, Kleen Prep and Phosphate enemas. The quality of bowel preparation was assessed by the performing endoscopists and classified into good (117/247; 47.4%), satisfactory (54/247, 21.9%) and poor (64/247, 25.9%). In the remaining 12 (4.8%), the quality of bowel preparation was not stated.

Sedation was utilised in 225/247 procedures. The majority had a combination of midazolam (median midazolam 4.0 mg; range 1–8) and an opiate (138/247). Midazolam alone was used in 75/247 (median 5 mg; range 1–12) while 12/247 had opiates alone. The opiates used were pethidine, fentanyl and pentazacine. Buscopan was given as requested by the colonoscopist. Colonoscopy was well tolerated in 198/247 (80.2%) patients. In eight, the procedure was poorly tolerated. The degree of patient tolerance was not documented in 41 cases.

The completion of colonoscopy was defined as reaching the caecum or (neo-) terminal ileum. The caecum was identified using fixed landmarks such as the ileocaecal valve, appendix orifice or the tri-radiate fold. In our series, the completion was achieved in 56% (117/247; 47.4%), satisfactory (54/247, 21.9%) and poor (64/247, 25.9%). In the remaining 12 (4.8%), the quality of bowel preparation was not stated.

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Table 1. Indications for colonoscopy

<table>
<thead>
<tr>
<th>Indication</th>
<th>n</th>
<th>Cancer</th>
<th>Polyp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemia</td>
<td>59</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Haematochezia</td>
<td>39</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Diarrhoea or constipation</td>
<td>37</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Polyp surveillance</td>
<td>32</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Cancer surgery follow-up</td>
<td>51</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>IBD surveillance and assessment</td>
<td>9</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Abnormal barium enema</td>
<td>26</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Acute large bowel obstruction</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Other indication</td>
<td>25</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Other indications include: weight loss, metastasis of unknown origin, family history, sigmoid volvulus, abdominal mass, abdominal pain, bleeding into colostomy bag and unknown.

n = number of indications.

NB. Some patients have multiple indications.