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Clinical Issues

Bridging the Osteoporosis Treatment Gap: Performance and Cost-Effectiveness of a Fracture Liaison Service

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Abstract

Individuals who sustain fragility fractures are at high risk of refracture. However, osteoporosis treatment rates remain low for these patients. Therefore, we aimed to assess the performance and cost-effectiveness of introducing a fracture liaison service (FLS) into a tertiary hospital. In ''nonhospitalized'' ambulatory patients who had sustained fragility fractures, we assessed baseline osteoporosis investigation and treatment rates, and subsequently, the impact of introducing an orthopedic osteoporosis policy and an FLS. Outcomes measured were uptake of osteoporosis intervention, patient satisfaction, and quality-adjusted life years (QALYs) gained. QALYs were calculated over 5 years using predicted fracture risks without intervention and estimated fracture risk reduction with intervention. At baseline (n = 49), 2% of ambulatory patients who had sustained fragility fractures underwent dual-energy X-ray absorptiometry (DXA) and 6% received osteoporosis-specific medication. After introduction of an osteoporosis policy (n = 58), 28% were investigated with DXA ($p < 0.0001$). However, treatment rates were unchanged. An FLS was introduced, reviewing 203 new patients over the inaugural 2 years (mean age [standard deviation], 67 (11) years; 77% female). All underwent DXA, and criteria for osteoporosis and osteopenia were identified in 44% and 40%, respectively. Osteoporosis medications were prescribed to 61% patients (risedronate: 22%, alendronate: 16%, strontium ranelate: 13%, zoledronic acid: 8%, other: 2%). Eighty-five of 90 questionnaire respondents were very satisfied or satisfied with the FLS. With the treatment prescribed over 5 years, we conservatively estimated that this FLS would reduce nonvertebral refractures from 59 to 50, improving QALYs by 0.054 and costing $1716 per patient (incremental cost-effectiveness ratio: $31749). This FLS model improves uptake of osteoporosis intervention guidelines, is popular among patients, and improves cost-effectiveness. Thus, it has the capacity to substantially improve health in a cost-effective way.

Key Words: Cost-effectiveness; fracture liaison service; osteoporosis; treatment.

Introduction

Osteoporosis and osteopenia were shown to affect 4.74 million Australians aged >50 years in 2012 (66% of people aged >50 years), resulting in 140,822 fractures *(1)*. By 2022, it is estimated that 6.2 million Australians over 50 years will have osteoporosis or osteopenia *(1)*. The direct and indirect costs of this health burden for Australia in 2012 were 2.75 billion Australian dollars (AUD) and this burden is predicted to rise to AUD 3.84 billion by 2022, with the majority borne by hospitals and nursing homes *(1)*. A significant burden of disease has also been reported for other developed nations, with osteoporosis-related fractures amounting to >2 million and costing almost $17 billion in the United States of America in 2005 *(2)*. Despite this volume of disease and the

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availability of effective treatment, it has been shown that after sustaining a fracture, osteoporosis investigation and treatment rates remain low. Considering studies from the United States of America, in 2000, 24% of women aged >50 years who fractured their wrists received investigations or treatment for osteoporosis *(3)*; in 2004, the rate of treatment for women who sustained a hip fracture was 18% *(4)*, whereas in 2007, 20% of women who sustained a hip fracture received bone density assessment or treatment for osteoporosis *(5)*.

Implementation of fracture liaison service (FLS) models around the world has been associated with greater diagnosis of osteoporosis and improved treatment rates for fracture risk reduction *(6–9)*. A variety of FLS models have been successfully adopted for secondary fracture prevention *(10)*. The cost-effectiveness of few FLS models has been evaluated *(11–13)*, however, nurse-led or junior medical officer–led FLS models appear cost-effective in the health care systems of the United Kingdom, the United States, and Australia.

The aims of this study were to determine baseline osteoporosis investigations and treatment rates at orthopedic fracture clinics at the Royal Melbourne Hospital (RMH), to assess the effect of introducing an orthopedic unit osteoporosis policy, and to assess the performance and cost-effectiveness of introducing an alternative FLS model that targets individuals that do not require hospitalization after a suspected low-trauma fracture.

Methods

Baseline Osteoporosis Investigation and Treatment Audit

A 3-month audit of male and female patients aged >50 years attending any of the 5 weekly orthopedic fracture clinics at a single tertiary hospital was conducted between November 2008 and January 2009. Osteoporosis investigations and treatments were assessed for those presenting to the emergency department with a suspected low-trauma fracture who did not require hospital admission. A low-trauma fracture was defined as a fracture due to a fall from standing height or less. Investigations of interest were dual-energy X-ray absorptiometry (DXA) based on recommendations by the International Society of Clinical Densitometry, serum 25-hydroxyvitamin D (25OHVitD), serum calcium, and renal function tests (RFTs). Treatments of interest were calcium supplements, vitamin D, and osteoporosis-specific agents.

Orthopedic Osteoporosis Policy

A simple orthopedic osteoporosis policy developed in partnership with relevant clinicians was introduced immediately after the baseline audit. The policy advised orthopedic doctors to perform DXA, serum 25OHVitD, calcium, and RFTs for all patients aged >50 years who had sustained a suspected low-trauma fracture. The policy also recommended that orthopedic doctors provide dietary advice or supplementation for patients with inadequate calcium intake or low 25OHVitD (<50 nmol/L). A letter recommending consideration of osteoporosis-specific therapy was sent to the patient's general practitioner (GP). A repeat audit of osteoporosis investigations and treatments was performed between November 2009 and January 2010 to assess the effect of the policy.

Implementation of an FLS

In April 2010, a hospital FLS was introduced for patients aged >50 years who presented after a low-trauma fracture and who did not require hospital admission. A part-time nurse coordinator (0.3 equivalent full-time hours [EFT]) identified eligible patients at orthopedic fracture clinics at RMH and provided a letter explaining the FLS. Investigations to screen for underlying causes of bone fragility were arranged for consenting patients, including DXA and blood tests (RFTs, liver function, calcium, thyroid function, serum protein electrophoresis, 25OHVitD, complete blood examination). Patients were then referred to an endocrinologist (0.1 EFT) for osteoporosis assessment at a hospital outpatient clinic. The endocrinologist independently determined diagnosis and therapy on the basis of Australian National Health and Medical Research Council guidelines and patient preferences *(14)*. At the time of the initial appointment, all patients prescribed an osteoporosis-specific medication were given a follow-up appointment 3 months later to assess medication tolerance and adherence before discharge to the care of their GP. Those not commenced on osteoporosis therapy were discharged to their GP. For all patients, the GP received standardized correspondence outlining the diagnosis, major risk factors for osteoporosis, investigation findings, and osteoporosis therapy including nonpharmacologic management. After 2 years, we conducted a quality assurance project to assess FLS performance and cost-effectiveness.

Performance of the FLS

Performance was assessed via a clinic database review performed by an independent investigator and a 13-point patient questionnaire focused on comprehension, satisfaction, and compliance with FLS management. The questionnaire was mailed to patients, with a target response of 50% within 2 months. Patients who had not returned the questionnaire within 3 weeks were systematically reminded by telephone.

Cost-Effectiveness of the FLS

The costs of investigations, osteoporosis medications, and GP appointments to obtain repeat prescriptions were based on the 2012 Australian Medicare Benefits and Pharmaceutical Benefits Schedules *(15,16)*. Investigations requested by the FLS amounted to AUD 223 per patient, whereas the total annual medication-specific costs for GP appointments and dispensing were as follows: alendronate AUD 391.34, risedronate AUD 639.41, zoledronic acid AUD 605.47, strontium ranelate AUD 714.89, and denosumab AUD 642.34. Annual staff salaries for the nurse coordinator and endocrinologist totaled AUD 43,928. Osteoporosis medication efficacy was obtained from either Cochrane review data or pivotal publications for zoledronic acid and denosumab *(17–21)*. Fracture risk reduction was conservatively estimated to be that at nonvertebral