

# Are we closing the gaps in the management of osteoporosis following fragility fractures of the femur?

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## Abstract

**Objective:** The objective of this study was to identify deficiencies in initiating anti-osteoporotic treatment following a fragility femoral fracture.

**Methods:** All patients  $\geq 55$  years of age treated for a fragility femoral fracture between June 2012 and May 2017 were enrolled. Medications at discharge and at 90 days and 1 year of follow up were analyzed. Patients were classified into 4 groups: Group I did not receive any treatment for osteoporosis; Group II received only calcium and vitamin D<sub>3</sub>; Group III received an anabolic agent, calcium, and vitamin D<sub>3</sub>; and Group IV received bisphosphonates, calcium, and vitamin D<sub>3</sub>.

**Results:** A total of 167 patients with an average age of  $65.81 \pm 12.55$  years were included. There were 88 (52.7%) males and 79 (47.3%) females. At discharge, 107 patients (64.1%) were not prescribed optimal treatment for osteoporosis, and this reduced to 55 (32.9%) at the 90-day follow up. At 1 year, the number of patients receiving suboptimal treatment was further reduced to 25.74%.

**Conclusions:** Although the number of patients with fragility fractures receiving insufficient treatment was lower in the present study than in previous reports, increased efforts and coordinated treatment plans initiated by a fracture liaison service should be of high priority.

## Keywords

Osteoporosis, fragility fracture, femur, Saudi Arabia, secondary prevention, treatment gap

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## Introduction

Osteoporosis is a major issue in the developing world, and is associated with a financial as well as a social burden. The incidence of osteoporosis in Saudi Arabia has been reported as 39% in men and 33% in postmenopausal women.<sup>1</sup> Furthermore, rates of morbidity and mortality are increased following fragility fractures.<sup>2</sup> Although awareness of osteoporosis and its complications has been widely promoted by health care authorities, treatment strategies remain suboptimal.

In 2014, a gap in treatment was reported to exist for approximately 30% of patients, a figure markedly lower than previously reported.<sup>3</sup> Jennings et al. (2010)<sup>4</sup> found that only 2% of patients were prescribed appropriate therapy of calcium, vitamin D, and an anti-resorptive or anabolic medication. Hajcsar et al. (2000)<sup>5</sup> reported that among patients attending fracture clinics after a fragility fracture, only 20% received the appropriate treatment. Black, Follin, and McDermott (2001)<sup>6</sup> reported that, compared with the general population, patients had an 8-fold increased risk for fracture of the contralateral hip after the first fragility fracture of the femur. Furthermore, the risk of a second hip fracture within 1 year was increased by 6%–12%.<sup>6–8</sup> Finally, Chapuy and Meunier (1996)<sup>9</sup> reported that the incidence of a second fracture was reduced by 30% with timely initiation of appropriate treatment.

Our earlier analysis for 2000–2011<sup>3</sup> demonstrated a reduction in the treatment gap from 76% to 30%, and the objective of the present study was to evaluate whether this gap in the management of osteoporosis after fragility fracture of the femur has since been further reduced.

## Methods

King Fahd Hospital of the University, Al-Khobar is a 550-bed tertiary care center

attached to the College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia. The center is a training institute, and at any given time there are 20–25 training residents within the department of orthopedic surgery. The department has 4 units: pediatric, spine, upper limb and shoulder, sports injuries, and arthroplasty. We retrospectively identified and reviewed patients' medical records and the QuadraMed Patient Identity Solutions Program to assess the medications entered during the hospital stay and after discharge. All patients aged  $\geq 55$  years who were admitted between June 2012 and May 2017 with a fragility femoral fracture were included in the study. Patients with secondary osteoporosis were excluded from the analysis. Following discharge, patients were followed up in the orthopedic clinic, and details of prescribed medications were collected at discharge, at 90 days follow up, and at 1 year follow up. Group I was defined as patients who did not receive any treatment; Group II as those who received only calcium and vitamin D<sub>3</sub>; Group III as those who received terapatide, calcium, and vitamin D<sub>3</sub>; and Group IV as those who received bisphosphonates, calcium, and vitamin D<sub>3</sub>.

Ethical Approval was taken from the IRB of the Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

## Results

A total of 167 patients with an average age of  $65.81 \pm 12.55$  years were treated during the study period. There were 88 (52.7%) male patients and 79 (47.3%) females. In 72 (43.1%) patients the right femur was fractured and in 95 (56.9%) the left (Table 1). Thirty-six patients (21.6%) were categorized in Group I, 71 (42.5%) in Group II, 44 (26.34%) in Group III, and 16 (9.6%) in Group IV at discharge. At 90 days follow up in the outpatient clinic,

**Table 1.** Demographic data of patients with fragility femoral fractures.

Total number of patients	167
Males	88 (52.7%)
Females	79 (47.3%)
Right femur fracture	72 (43.1%)
Left femur fracture	95 (56.9%)
First fracture	155 (93.5%)
Second fracture	11 (6.5%)

**Table 2.** Prescribed treatment at discharge, 90 days, and 1 year.

Group	Discharge	90 days	1 year
I	36	18	18
II	71	37	25
III	44	69	71
IV	16	43	53

Group I = no treatment; Group II = calcium + vitamin D<sub>3</sub>; Group III = teraperatide + calcium + vitamin D<sub>3</sub>; Group IV = bisphosphonate + calcium + vitamin D<sub>3</sub>.

the distribution was 8.98% in Group I, 22.1% in Group II, 41.31% in Group III, and 25.8% in Group IV. At discharge, 107 patients (64.1%) did not receive the appropriate treatment for osteoporosis, and this reduced to 55 (32.9%) at the 90-day follow up. At 1 year, this was further reduced to 25.74% (Table 2). At 1 year, more males than females were not receiving the appropriate treatment (29.5% versus 21.5%,  $p < 0.01$ ) (Table 3). After discharge, 11 (6.58%) patients were readmitted with a second fracture. At 90 days, male patients were more likely to not receive the appropriate treatment compared with the females ( $p < 0.001$ ), and the trend continued at 1 year, with 17% of males and 3.79% of females not receiving anti-osteoporotic treatment ( $p < 0.001$ ). Over 62% of the patients received tereperatide rather than an anti-resorptive, and 9(5.38%) patients had complications involving non-union of

**Table 3.** Comparison between male and female patients.

Group	Discharge		90 Days		1 year	
	Male	Female	Male	Female	Male	Female
I	29	7	15	3	15	3
II	38	33	22	15	11	14
III	10	34	27	42	25	46
IV	11	5	24	19	37	16

Group I = no treatment; Group II = calcium + vitamin D<sub>3</sub>; Group III = teraperatide + calcium + vitamin D<sub>3</sub>; Group IV = bisphosphonate + calcium + vitamin D<sub>3</sub>.

the fracture that required revision surgery (1 in Group III and 8 in Group IV).

### Discussion

Our study shows that, after experiencing a fragility fracture, 64.1% of patients did not receive appropriate treatment for osteoporosis at the time of discharge. This figure was further reduced to 32.9% at the 90-day follow up and 25.74% at 1 year. In comparison with our previous study,<sup>3</sup> the current treatment figures were initially worse, but at the 1-year follow up our missed secondary prevention figures reached 25.74%. Regardless a deficiency in instating the appropriate treatment remained. We suggest that the reduction in patients not receiving appropriate treatment at 90 days and 1 year was attributable to correction of the treatment strategy by the specialists running the outpatient clinics. There are several reasons why patients may be discharged from hospital with insufficient treatment for osteoporosis. Being a tertiary care center with an ongoing residency training program, the orthopedic trauma department is staffed by a common pool of surgeons of various subspecialties. The majority of treatment deficiencies were identified among patients treated in the upper limb and sports injury unit, which treats older adults less

frequently. Furthermore, training residents rotate every 3 months, and insufficient training in the treatment of osteoporosis after fragility fracture may result. Finally, among patients with very low vitamin D levels and high parathyroid hormone levels, the parathyroid levels required approximately 3 months to normalize before an anabolic agent (teraperatide) could be initiated, thus predisposing the patient to classification in one of the groups that received inadequate treatment.

Wilk et al.<sup>10</sup> reported that, in a large population study, that 72% of women were neither investigated for osteoporosis nor offered any treatment for the condition, and that at 1 year only 23% received osteoporosis treatment. A recent study also showed that only 27.7% of women were treated with osteoporosis medications after fragility fractures within 12 months of the index fracture, while 72.2% were left untreated.<sup>11–15</sup>

In the present study, 75% of patients received appropriate anti-osteoporotic treatment at 1 year, but a significant gap remains to be closed. Brandi (2014)<sup>16</sup> stated that “Secondary fracture prevention is good, avoiding the first fracture, better still”. In European countries, primary prevention of fractures by early diagnosis and treatment peaked in approximately 2008, and is currently falling.<sup>17</sup> It has been observed that male patients with osteoporosis were less likely to receive appropriate treatment after a fragility fracture compared with their female counterparts.<sup>18</sup>

This study had several limitations. Our analysis was performed retrospectively, and the number of cases was small. A key strength of our study, however, was the ability to compare the present data with those from a similar previous study from the same institution. In conclusion, our findings show a lack of improvement from the earlier reported study of the secondary prevention of fragility fractures. We have

identified factors that potentially contribute to this lack of progress, and anticipate that appropriate education and the dissemination of the present study findings lead to future improvements in outcomes. Prevention of a second fracture is of critical importance for hospitalized patients with fragility fractures, and significant efforts alongside primary prevention programs are required to also decrease the incidence of the first fragility fracture.

### Authors' contributions

All the authors have participated in the concept, gathering the data, review of literature and writing of the manuscript.

### Availability of data and materials

The data are available in the Research Monitoring Department of the Imam Abdulrahman Bin Faisal University, Dammam.

### Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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### References

1. Sadat-Ali M, Al-Habdan IM, Al-Turki HA, et al. An epidemiological analysis of the incidence of osteoporosis and osteoporosis-related fractures among the Saudi Arabian population. *Ann Saudi Med* 2012; 32: 637–641.
2. Sadat-Ali M, Alfaraidy M, AlHawas A, et al. Morbidity and mortality after fragility hip fracture in a Saudi Arabian

- population: report from a single center. *J Int Med Res* 2017; 45: 1175–1180.
3. Sadat-Ali M, Al-Omran A, Al-Bakr W, et al. Established osteoporosis and gaps in the management: review from a teaching hospital. *Ann Med Health Sci Res* 2014; 4: 198–201. doi: 10.4103/2141
  4. Jennings LA, Auerbach AD, Maselli J, et al. Missed opportunities for osteoporosis treatment in patients hospitalized for hip fracture. *J Am Geriatr Soc* 2010; 58: 650–657.
  5. Hajcsar EE, Hawker G and Bogoch ER. Investigation and treatment of osteoporosis in patients with fragility fractures. *CMAJ* 2000; 163: 819–822.
  6. Black JN, Follin SL and McDermott MT. Osteoporosis diagnosis and management following hip fracture. *J Bone Miner Res* 2001; 16: S214.
  7. Papaioannou A, Wiktorowicz M, Adachi JD, et al. Mortality, independence in living, and re-fracture, one year following hip fracture in Canadians. *J Soc Obstet Gynaecol Can* 2000; 22: 591–597.
  8. Berry SD, Samelson EJ, Ngo L, et al. Subsequent fracture in nursing home residents with a hip fracture: a competing risks approach. *J Am Geriatr Soc* 2008; 56: 1887–1892.
  9. Chapuy MC and Meunier PJ. Prevention of secondary hyperparathyroidism and hip fracture in elderly women with calcium and vitamin D3 supplements. *Osteoporos Int* 1996; 6(Suppl 3): 60–63.
  10. Wilk A, Sajjan S, Modi A, et al. Post-fracture pharmacotherapy for women with osteoporotic fracture: analysis of a managed care population in the USA. *Osteoporos Int* 2014; 25: 2777–2786.
  11. Keshishian A, Boytsov N, Burge R, et al. Examining the treatment gap and risk of subsequent fractures among females with a fragility fracture in the US Medicare population. *Osteoporos Int* 2017; 28: 2485–2494. doi: 10.1007/s00198-017-4072-6. [Epub ahead of print]
  12. Svedbom A, Hernlund E, Ivergård M, et al. EU review panel of the IOF. Osteoporosis in the European Union: a compendium of country specific reports. *Arch Osteoporos* 2013; 8: 137–218.
  13. Rosier RN. Expanding the role of the orthopaedic surgeon in the treatment of osteoporosis. *Clin Orthop Relat Res* 2001; 385: 57–67.
  14. Marsh D, Akesson K, Beaton DE, et al. Coordinator-based systems for secondary prevention in fragility fracture patients. *Osteoporos Int* 2011; 22: 2051–2065.
  15. Yates CJ, Chauchard MA, Liew D, et al. Bridging the osteoporosis treatment gap: performance and cost-effectiveness of a fracture liaison service. *J Clin Densitom* 2015; 18: 150–156.
  16. Brand ML. Secondary fracture prevention is good, avoiding the first fracture, better still. *Medicographia* 2014; 36: 192–196.
  17. Hernlund E, Svedbom A, Ivergård M, et al. Osteoporosis in the European Union: medical management, epidemiology and economic burden. A report prepared in collaboration with the International Osteoporosis Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA). *Arch Osteoporos* 2013; 8: 136. DOI: 10.1007/s11657-013-0136
  18. Marx KA and Quinn CC. Commentary: male osteoporosis—policy gaps in prevention and treatment. *J Aging Soc Policy* 2009; 21: 119–129.