

# The aftermath of hip fragility fractures – are we missing out on osteoporosis treatment?

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## ABSTRACT

**Introduction:** Fragility fractures cause significant mortality and morbidity. Even though there are multiple guidelines for the management of fragility fractures, European countries still report treatment rates of less than 30%. Implementation of fracture liaison services can increase this percentage by 21%. Our goal is to describe the management of osteoporosis, in patients with hip fragility fracture treated in a Portuguese hospital with no internal protocols in place.

**Methods:** A retrospective study was conducted. Patients treated surgically for hip fragility fracture in our hospital, during 2017, were included. Data until May 2020 was collected on osteoporosis recognition and pharmacological treatment prescription.

**Results:** A total of 102 patients were included, 87% female, with a mean age of 79.9±9.9 years at the time of the fracture. Pharmacological anti-osteoporotic treatment after the hip fragility fracture was prescribed in 35%. From those, 53% did not include bisphosphonates. General practice doctors were responsible for 44% of anti-osteoporotic prescriptions and “Osteoporosis” ICD10 codification in primary care was present in 10.7%.

**Discussion/Conclusion:** We found a gap in osteoporosis treatment after a hip fragility fracture, similar to literature reports when no fracture liaison service is in place. We believe that the lack of such protocols, the low rate of “osteoporosis” or “fragility fracture” mentioning at hospital discharge, together with the under recognition at primary care level, contribute to this reality. The implementation of new measures is crucial to improve prevention and management of fragility fractures.

**Keywords:** Osteoporosis; Hip fracture; Osteoporotic fracture.

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## INTRODUCTION

In 2010, osteoporosis was estimated to affect 27.6 million people in the European Union, representing 5.5% of the total population<sup>1</sup>. In 2016, 10,2% of the Portuguese adult population was estimated to suffer from osteoporosis (17% women and 2.6% men), being the 4th most prevalent rheumatic and/or musculoskeletal disease, after low back pain, periarticular disease and knee osteoarthritis<sup>2</sup>. With 51.821 osteoporotic fractures reported in Portugal in 2010 alone, and a 33% increase expected by 2025, this is a pressing issue to address<sup>1</sup>.

In the Portuguese population above 65 years-old, hip fractures accounted for up to 36% of osteoporotic fractures, with a 12.4% increase between 2005 and 2013 and the highest rate of mortality and morbidity reported<sup>1,3</sup>. Among men and women who experienced premature mortality due to a fracture, 47% and 50% respectively were attributed to hip fracture<sup>1</sup>. Functional recovery occurs mainly in the first 6 months after the fracture, but only 40 to 60% of patients recover their pre-fracture level of mobility and ability to perform normal activities of daily living<sup>4</sup>. Hip fractures also represent the highest fracture-related expenses, with costs, in Portugal, between 12,031€ to 13,434€ in the first year and 5,985€ in the second year<sup>5</sup>.

Recommendations by international and national work groups, are available for prevention, diagnosis and management of osteoporosis<sup>6,7</sup>. Guidelines clearly state that patients above 50 years-old, who suffered a fragility fracture (defined as a fracture following a fall from standing height or equivalent force), with no contraindications, should be started on anti-osteoporotic treatment, in order to lower refracture risk<sup>7</sup>. Still, recent European studies describe treatment rates of less than 30% after an osteoporotic fracture, with similar percentages when only hip osteoporotic fractures are considered<sup>8-10</sup>.

A recent study conducted by a Portuguese universi-

ty hospital found that only 12,1% of patients received anti-osteoporotic treatment after a hip osteoporotic fracture<sup>11</sup>. Calcium/vitamin D supplementation alone was prescribed in more than half of these patients, even though generic oral alendronate is considered the first line osteoporosis treatment due to its cost-effectiveness and overall reduction of hip and non-spine risk fracture by 49–55%<sup>6,11-12</sup>.

Fracture liaison services are the most effective fracture prevention interventions described in literature, increasing treatment rates by at least 21% when compared to usual care, with a subsequent cost reduction of osteoporotic fracture management<sup>13-15</sup>. These organized programs are based on care coordinator, multifaceted interventions that involve a streamlined process, from screening to follow-up and an organized transition from specialist to primary care. They comprise a multidisciplinary process that involves allied health services and address relevant issues such as fall prevention<sup>16</sup>.

At our Health Unit, no internal protocol for osteoporosis management is in place, thus we suspect failure to provide standard-of-care with appropriate fragility fracture treatment and prevention. In an effort to clarify how osteoporosis is managed in our institution, the Orthopedic and Physical and Rehabilitation Medicine Departments joined efforts.

Our primary aim is to determine how many of patients admitted with osteoporotic hip fracture, in our hospital during the year of 2017, received anti-osteoporotic pharmacological treatment and to describe treatment type. Our secondary aim is to understand osteoporosis recognition, either by bone densitometry (DXA), or by pharmacological treatment prescription or by ICD10 “Osteoporosis” informatic codification at primary care level.

## METHODS

A retrospective study was conducted. Records of ICD-9 codes for proximal femur fractures treatment (ICD-9 codes 0085, 785, 7850, 7855, 7905, 791, 7915, 7919, 793, 7930, 7935, 7939, 8151, and 8152) were selected from all orthopedic surgical procedures performed in 2017, at our hospital.

Through individual record analysis, we selected the patients who suffered an osteoporotic hip fracture (from a low energy trauma, such a fall from standing position), not related with secondary causes

(such malignancy). Patients who were dead at the time of data collection, were included only for mortality analysis and excluded from further investigation. Patients whose informatics database access was blocked/limited, were also excluded.

For each patient, data was recorded regarding: pharmacological anti-osteoporotic treatment prescription (type and medical speciality responsible for prescription), history of potentially fragility fractures (hip, vertebral, proximal humeral and forearm fracture), DXA results and ICD-10 “Osteoporosis” codification at primary care level.

Data was collected through informatic medical records, using the health database “*Plataforma de Dados de Saúde (PDS)*”, the primary care database “*Registro de Saúde Eletrónico (RSE)*” and the pharmacologic prescription electronic program “*Prescrição Eletrónica de Medicamentos (PEM)*”. Data until May2020 was included.

Descriptive statistics were performed using mean and standard deviation for continuous variables and frequency and percentages for categorical variables. All statistical analyses were performed using the IBM SPSS statistic software version 22.0.

This investigation was approved by our institution’s Ethics Committee, in accordance with the Helsinki declaration.

## RESULTS

During the year of 2017, 862 procedures, in 385 different patients, were codified with the ICD-9 codes previously described. After individual record screening, a total of 175 patients with hip osteoporotic fractures were selected. Of those, 73 patients were excluded due to no access to the informatic data: 69 were dead, representing a mortality rate by all causes until March of 2020 of 39%, and in 4 we had no informatic access for unknown reasons.

The remaining 102 patients were included for subsequent analysis. Mean population age at the time of fracture was  $79.86 \pm 9.92$  years and 87% were female. A total of 92 (92%) patients were either women with  $\geq 65$  years of age or men with  $\geq 70$  years of age.

### BEFORE THE HIP FRACTURE

According to the RSE database, 9 (9%) patients were previously identified as having “Osteoporosis” by their general practice doctor.

**TABLE I. RESULTS BEFORE AND AFTER HIP FRAGILITY FRACTURE**

	Before Hip Fracture	After Hip Fracture
Female - n (%)		89 (87%)
Age at event - mean±SD		79.86±9.9 years
ICD-10 Osteoporosis Coding- n (%)	9 (9%)	11 (11%)
History of other fractures - n (%)	23 (23%)	11 (11%)
Contralateral hip fracture - n	6	3
Vertebral fracture - n	8	2
Proximal humeral fracture - n	2	1
Forearm fracture - n	4	2
Other (traumatic) fractures - n	3	3
DXA - n (%)	22 (22%)	9 (9%)
Normal - n	1	1
Osteopenia - n	11	1
Osteoporosis - n	10	7
Treatment – n (%)	30 (29%)	36 (35%)
Treatment with bisphosphonates - n	18	17

SD: standard deviation; ICD-10: International Classification of Diseases 10th Revision); DXA: dual-energy x-ray absorptiometry

A previous fracture, probably related with osteoporosis, was present in 20 (20%) of the patients: 8 had one or more vertebral fracture, 6 had a contralateral hip fracture, 4 had a forearm fracture and 2 had a proximal humeral fracture.

DXA before the event was performed in 22 (22%) patients. Osteoporosis was confirmed in 10, and from those, 9 (90%) were prescribed anti-osteoporosis treatment.

Before the hip fracture, 30 patients (29%) had already been prescribed anti-osteoporosis therapy for an average of 4.5±3.5 years. From those, 13 (43%) patients were treated with bisphosphonate together with vitamin D and/or calcium, 12 (40%) with vitamin D and/or calcium supplementation alone and 5 (17%) with bisphosphonate alone.

Before the hip fracture, 72 patients had not received any prior treatment. From those, 9 (13%) have had a previous probable osteoporotic fracture and 4 (6%) had known abnormal DXA results.

#### AFTER HIP FRACTURE

An additional 2 patients were coded by the general practice doctor as suffering from Osteoporosis after the hip fragility fracture, resulting in a total of 11 (11%) identifications through ICD10 coding out of the total 102 patients.

When considering the 30 patients previously treat-

ed for osteoporosis: 13 (43%) continued on the previously prescribed treatment, 12 (40%) were not prescribed any treatment after the hip fracture and 5 (17%) were prescribed a different treatment.

In the 72 patients with no previous anti-osteoporosis medication, 18 (25%) were prescribed treatment after hip fracture. Time until treatment prescription was a mean 17 months, with 6 patients being prescribed in the first 6 months after the event, 7 between 6 months and 1 year and 4 during the 2nd or 3rd year after hip fracture.

In total, from the 102 patients, 36 (35%) received pharmacological treatment for osteoporosis after the hip fragility fracture. Within the treated group, 19 (53%) were prescribed vitamin D and/or calcium supplementation alone, 15 (42%) bisphosphonate combined with vitamin D and/or calcium supplementation and 2 (6%) bisphosphonate alone.

The medical doctor responsible for prescription was the general practice doctor in 16 (44%) patients. Orthopaedic surgeons were responsible for 5 (14%) and Physical Medicine, Rheumatology, Oncology, Internal Medicine for 1 (3%) patient each, with no data available in the other patients.

DXA after the event was performed in 9 (9%) of the 102 patients.

Up until May 2020, 8 (8%) patients had suffered another probable osteoporotic fracture. From those, 4

**TABLE II. MAIN OUTCOMES**

	n (%)
Patients that were previously prescribed treatment and changed, maintained or reinitiated treatment after the hip fracture	18 (16%)
Patients given treatment for the first time after the hip fracture	18 (16%)
Total treated after the hip fracture	36 (35%)
With bisphosphonates plus Vitamin D and/or Calcium	15 (42%)
With bisphosphonates alone	2 (5%)
With Vitamin D and/or Calcium alone	19 (53%)
Osteoporosis considered at any point (before or after event)	49 (48%)
Osteoporotic refracture incidence*	8 (8%)

\*until May2020, approximately 2-3years after main event

(50%) were previously prescribed vitamin D and/or calcium alone, 3 (38%) did not receive treatment and 1 (12.5%) was prescribed bisphosphonates with vitamin D and/or calcium.

#### OVERALL

Overall, 56 (55%) out of the 102 patients did not undergo treatment at any time, before or after the event.

After hip fragility fracture, 66 (65%) were not given pharmacological treatment, 19 (19%) were prescribed vitamin D and/or calcium supplementation alone, and 17 (17%) bisphosphonates with or without vitamin D and/or calcium supplementation.

Osteoporosis was identified as an issue, at any given time, in a total of 49 (48%) patients - either by DXA examination, by pharmacological treatment prescription or by ICD10 Osteoporosis codification at primary care.

#### DISCUSSION/CONCLUSION

The best practice for secondary fracture prevention starts with patient identification, followed by a protocolized post-fracture assessment within 8 weeks. A short term (6-12 months) and a long term (following years) management plan should be delineated and both primary and secondary care clinicians should be involved. This approach ensures the screening of secondary causes of osteoporosis, a multifaceted risk-factor assessment (including fall risk), and referral to the appropriate specialists when needed. Treatment should follow national guidelines and the fall prevention programs should comprise evidence-based interventions<sup>6,17</sup>.

Our hospital is integrated in a Local Health Unit, where resources are shared with the primary care centers of the region. This facilitates continuity of care and provides easier access to results of assessments and investigations. Nevertheless, only 35% of patient received pharmacological treatment after a hip osteoporotic fracture, and approximately half were not prescribed bisphosphonates as national guidelines advocates, representing a clear a gap in osteoporosis treatment.

Similarly to what has been previously described in literature, osteoporosis diagnosis and treatment failure may be due to multiple factors. We hypothesize that the use of terminology such “hip fracture”, instead of “hip fragility fracture” or “hip osteoporotic fracture” in clinical records, may contribute to the under recognition of osteoporosis as a clinical problem. Non-mention of osteoporosis diagnosis or need for anti-osteoporotic treatment in discharge records probably decreases the odds of treatment prescription at primary care level. Moreover, the lack of an explicit protocol with clarification of who and how should manage these patients, contributes to low guidelines implementation.

We emphasize the role of general practice doctors in recognizing osteoporosis and treatment prescription, since they were responsible for 44% of all prescription.

We conclude that osteoporosis treatment after hip fragility fractures is still overlooked in our Health Unit. Persists a considerable under recognition, under codification and miss management of osteoporosis, even after a fragility fracture has occurred, leading to a potentially higher re-fracture rate and all devastating consequences.

This study highlights the pressing need to imple-

ment a strategy for change in osteoporosis management. Global initiatives such ‘Capture the Fracture’ describe standards for best practice, allowing establishment of Fracture Liaison Service organizations with proven benefits in the prevention and management of fragility fractures<sup>17</sup>. We believe that such communication and organizational measures are needed and aim to address the challenge in the near future. This study also sets a baseline, enabling a comparison for future studies, when new measures are in place.

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