

RATE OF FRACTURES LEADING TO HOSPITALISATION AND HEALTHCARE BURDEN IN UNTREATED OSTEOPOROSIS ELDERLY PATIENTS IN GERMANY: AN InGef HEALTHCARE INSURANCE DATABASE ANALYSIS

Böcker W¹, Doobaree IU², Khachatryan A², Dornstauder E³, Worth G⁴, Kahangire DA⁴

¹Department of General, Trauma and Reconstructive Surgery, Munich University Hospitals, Ludwig-Maximilians-University, Munich, Germany, ²Certara – Evidence & Access (Analytica LASER), London UK, ³Amgen München, Germany, ⁴ Amgen (Europe) GmbH, Rotkreuz, Switzerland.

INTRODUCTION

- Osteoporosis (OP) is a skeletal disease that manifests as bone mineral density loss and low-trauma fractures. The prevalence of OP among people aged 50 years and over is estimated as 6.3 million in Germany.¹
- The proportion of patients aged 50 years and above who received treatment remained at very low levels in the past few years despite increase in the uptake of OP treatment between 2001 and 2010 in Germany.²

OBJECTIVES

- To estimate the incidence of fractures in untreated patients* with OP in Germany, and to describe their characteristics, rate of fractures, health resource utilization and cost burden.

*Patients who did not receive OP medications i.e. bisphosphonates, raloxifene, strontium ranelate, denosumab, teriparatide, bazedoxifene

METHODS

- Study design (Figure 1):** Retrospective study based on anonymised German health insurance claims database (InGef) containing data on approx. 4 million individual insurants (5% of the statutory insured) for the period 2010-2016.
- Inclusion criteria:**
 - Patients aged ≥ 70 years
 - Diagnosis of OP (ICD-10 codes M80/M81) or had a new fracture of interest (vertebrae, femur, hip, pelvis, wrist, forearm and humerus) at the time of hospital discharge or outpatient visit between 2012 and 2015.
 - No OP treatment at time of hospital discharge or outpatient visit and within 92 days after, excluding treatment with vitamin D and/or calcium supplements.

- Index date:** date of OP diagnosis or occurrence of a new fracture of interest.

- Follow-up period:** Index date to end of 2016 (including for post index fractures).

- Health resources utilisation (HRU) evaluated the number and duration of in-patient stay and the number of out-patient visits.

- Direct costs included expenditures incurred during hospitalisation, out-patient care, drugs used, and payment for sick-leave.

RESULTS

- 144,752 patients (mean age 79 years; 73% female, median follow-up of 3.2 years) met the eligibility criteria; 23% had a history of fractures, 48% of patients had cardiac diseases, 32% diabetes and 27% cerebrovascular disease (*Table 1*).

Table 1. Cohort characteristics

	All	Male	Female
Number of patients	144752	38844	105908
Mean age at entry in cohort (SD) years	79 (6.3)	78 (5.9)	79 (6.4)
Age distribution, N(%)			
70 to 75 years	50797 (35)	14596 (38)	36201 (34)
76 to 80 years	39550 (27)	11215 (29)	28335 (27)
>80 years	54405 (38)	13033 (34)	41372 (39)
History of falls and fractures, N(%)			
Had at least one fall	2392 (2)	737 (2)	1655 (2)
Had at least one fracture	33391 (23)	8127 (21)	25264 (24)
Treatment at index date and within 92 days after discharge, N(%)			
OP medications			
Vitamin D	5397 (4)	1470 (4)	3927 (4)
Calcium supplement	6687 (5)	1305 (3)	5382 (5)
Medications with impact on OP			
Corticosteroids	29427 (20)	8596 (22)	20831 (20)
Aromatase inhibitors	798 (1)	<5 (0)	795 (1)
Treatment prior to index date, N(%)			
OP medications			
Vitamin D	6039 (4)	1575 (4)	4464 (4)
Calcium supplement	8799 (6)	1481 (4)	7318 (7)
Other OP medication	918 (1)	58 (0)	860 (1)
Medications with impact on OP			
Corticosteroids	57026 (39)	15814 (41)	41212 (39)
Aromatase inhibitors	1147 (1)	<5 (0)	1143 (1)
Comorbidities [§] , N(%)			
Hypertension	113629 (79)	113629 (79)	83121 (78)
Cardiac disease*	69928 (48)	69928 (48)	48248 (46)
Diabetes [§]	46054 (32)	46054 (32)	32037 (30)
Type 2 Diabetes [^]	39943 (28)	39943 (28)	27506 (26)
Cerebrovascular disease	38558 (27)	38558 (27)	26234 (25)
Dysrhythmia	38339 (26)	38339 (26)	25785 (24)
COPD	24546 (17)	24546 (17)	15551 (15)
Anaemia	24037 (17)	24037 (17)	16640 (16)
Chronic kidney disease	19744 (14)	19744 (14)	12468 (12)
Peripheral artery disease	16566 (11)	16566 (11)	10142 (10)
Follow-up time			
Total, years	441042	109429	331613
Median (IQR) years	3.2 (3.1)	2.8 (2.8)	3.3 (3.3)

OP: Osteoporosis
* include heart failure
§ 10 most prevalent
COPD: Chronic obstructive pulmonary disease
£ ICD 10: E10*, E11*, E12*, E13*, E14*
^ ICD 10: E11*
IQR: Interquartile range

- 13% (43,514) of patients had at least one post-index fracture, common post-index site-specific fractures were femur (10%), vertebrae (12%) and forearm (12%) (*Figure 2*).
- 15% (26,949) of patients with a 1st post-index fracture received treatment(s) indicated for osteoporosis. Commonly prescribed OP treatments were bisphosphonates (15%) and denosumab (2%) (*Figure 3*).
- Among the drugs which can impact on OP, the use of corticosteroids was particularly high at 85% (22,970) for the whole patient cohort (*Figure 3*).

Figure 2. Distribution of post-index fractures by anatomical site during follow up: first and subsequent

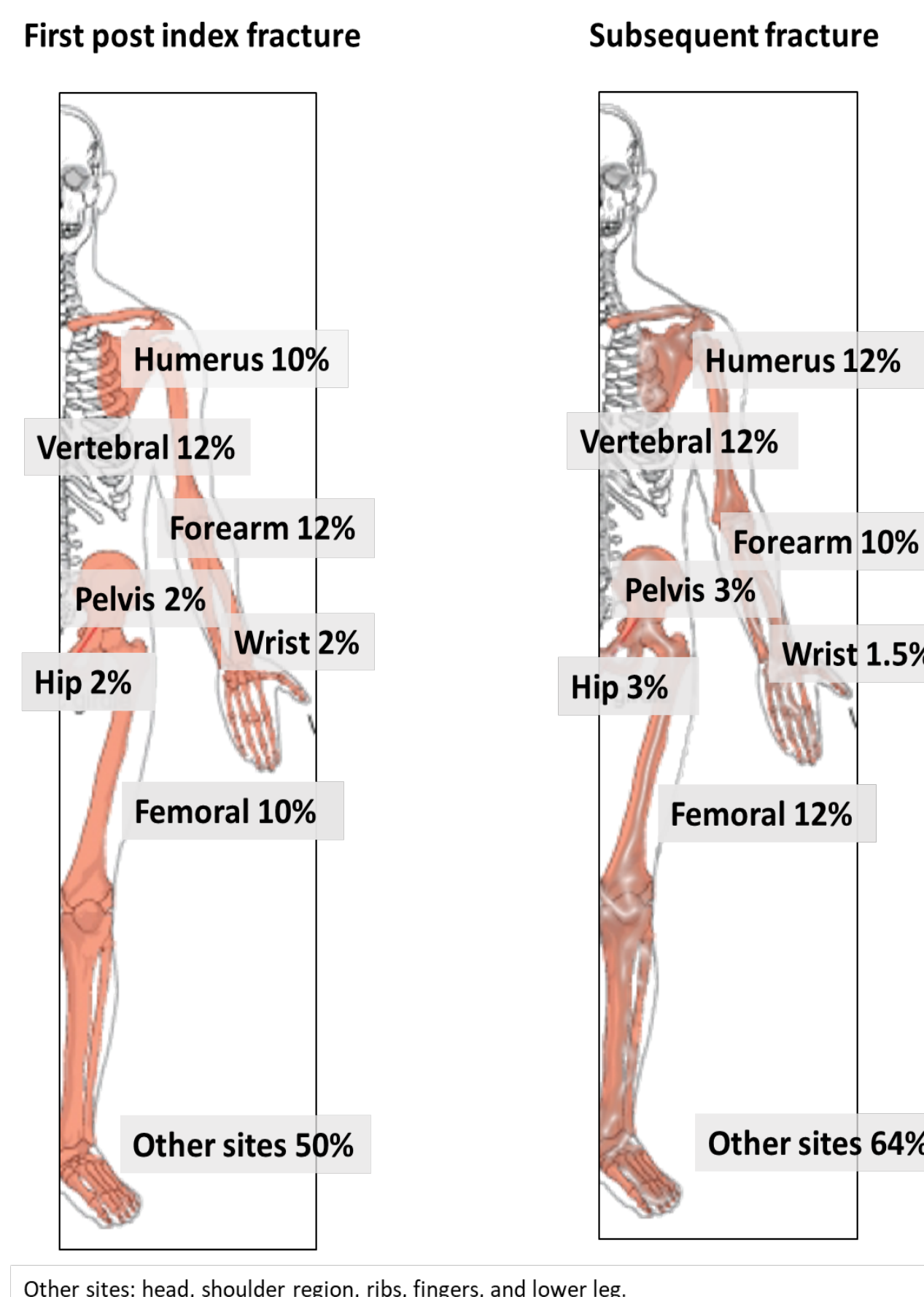
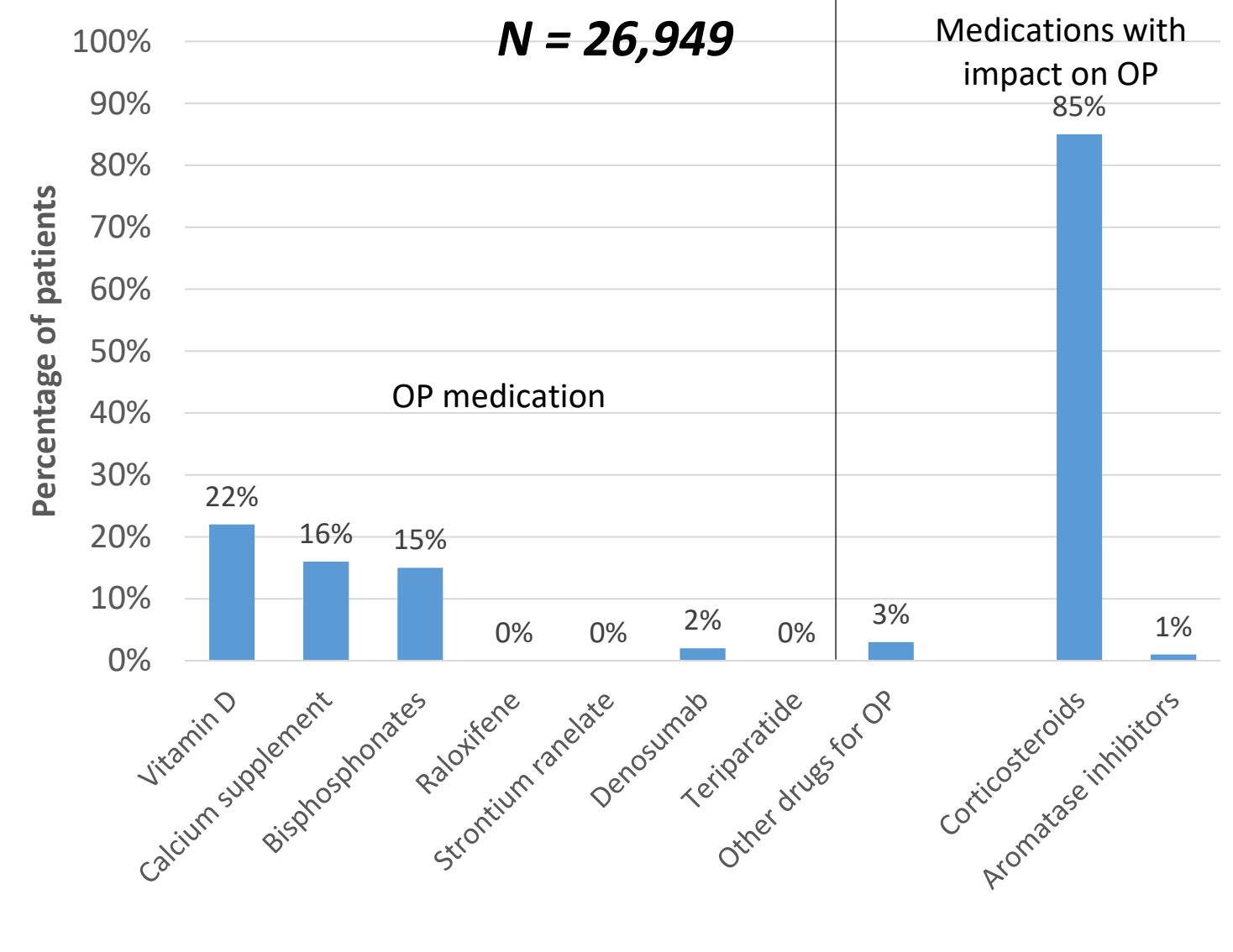


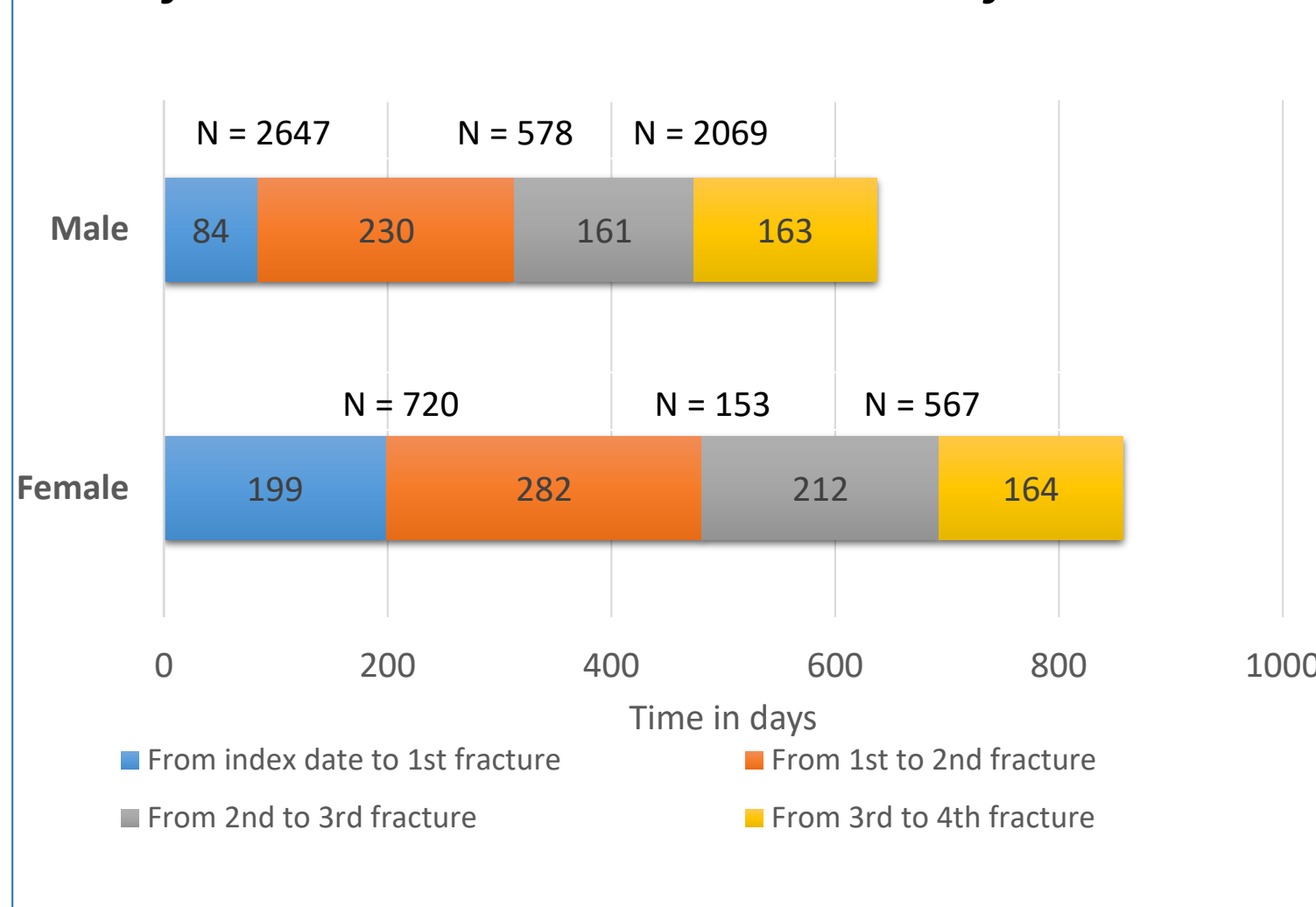
Figure 3. Distribution of treatment received among patients who had first post-index fracture N = 26,949



OP: Osteoporosis
Other OP drugs: strontium ranelate and colecalciferol, bazedoxifene and estrogen.

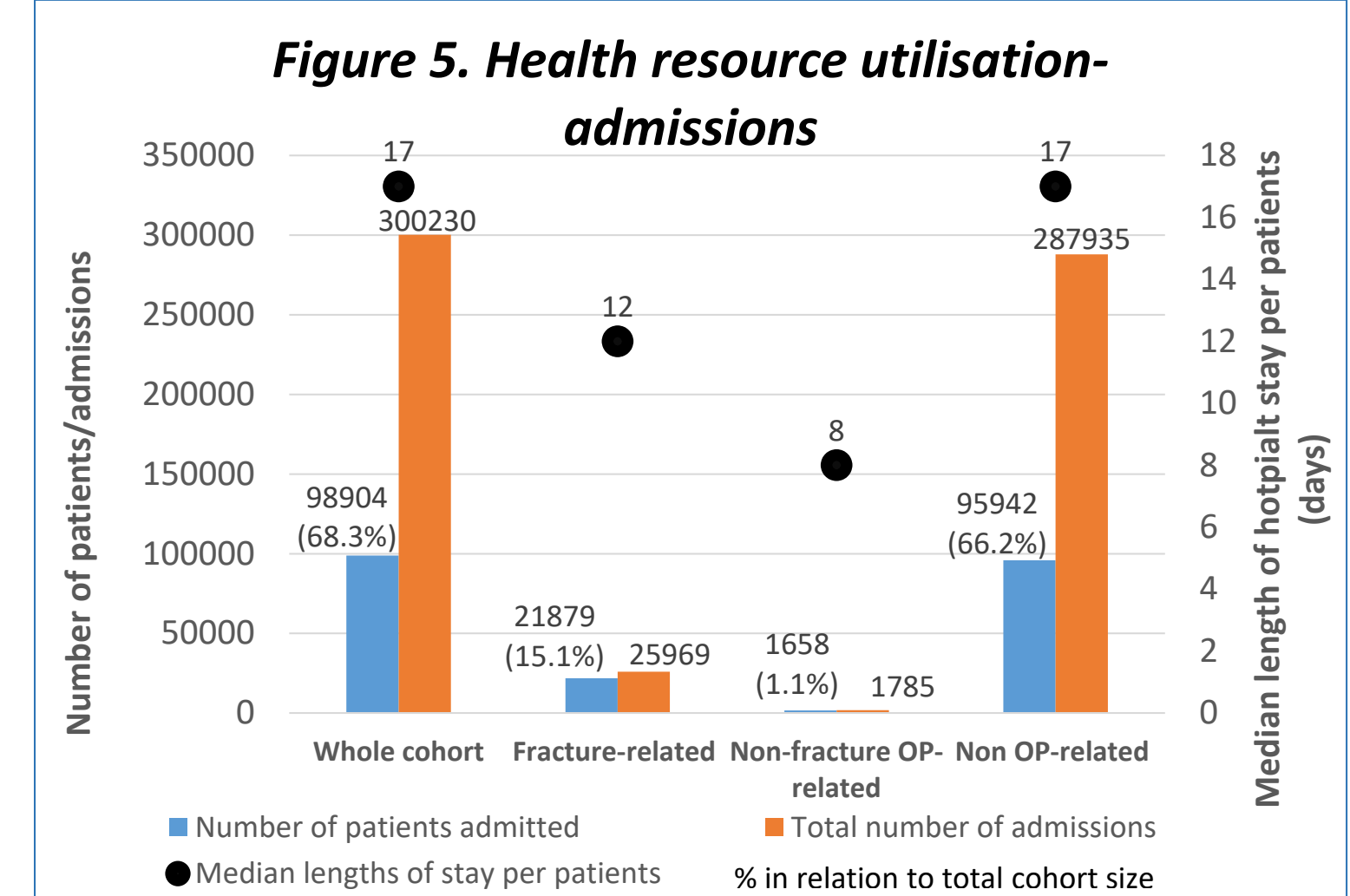
- Two or more post-index fractures were experienced in 7% (10,262) of patients.
- Median time from index date to 1st fracture was 145.5 days and 1st to 2nd fracture was 270.5 days. Gender specific median times are presented in *Figure 4*.

Figure 4. Number of patients with subsequent fractures following a first fracture and median time between fractures



N represents number of patients who had a subsequent fracture, e.g. 1st to 2nd.

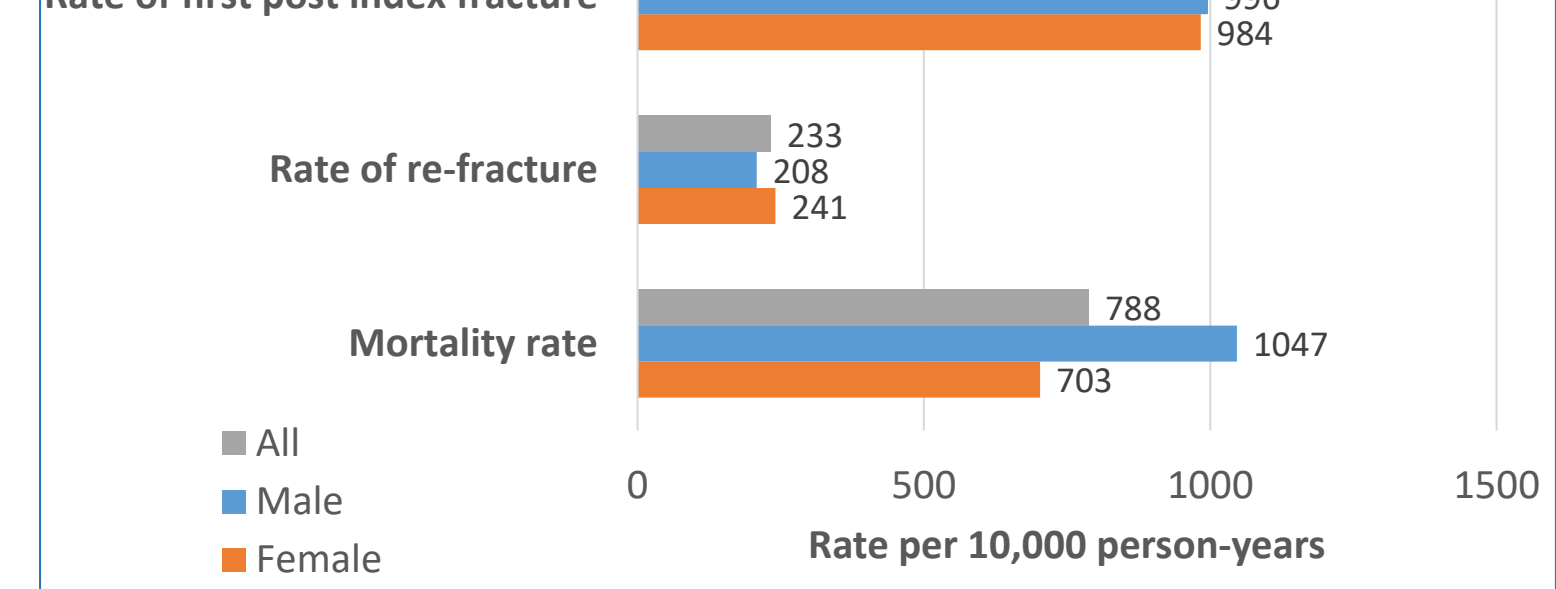
- Median number of all-cause admissions (*Figure 5*) and outpatient visits were 2 and 13 per patient, respectively.
- 15% (21,879) of patients were hospitalised for fractures, among whom 3% (667) had OP coded as the reason for their admissions.
- 1% (1,658) of patients were admitted for non-fracture OP care.
- Median length of hospital stay per patient for fractures and non-OP related stays were 12 and 17 days, respectively (*Figure 5*).



OP: Osteoporosis

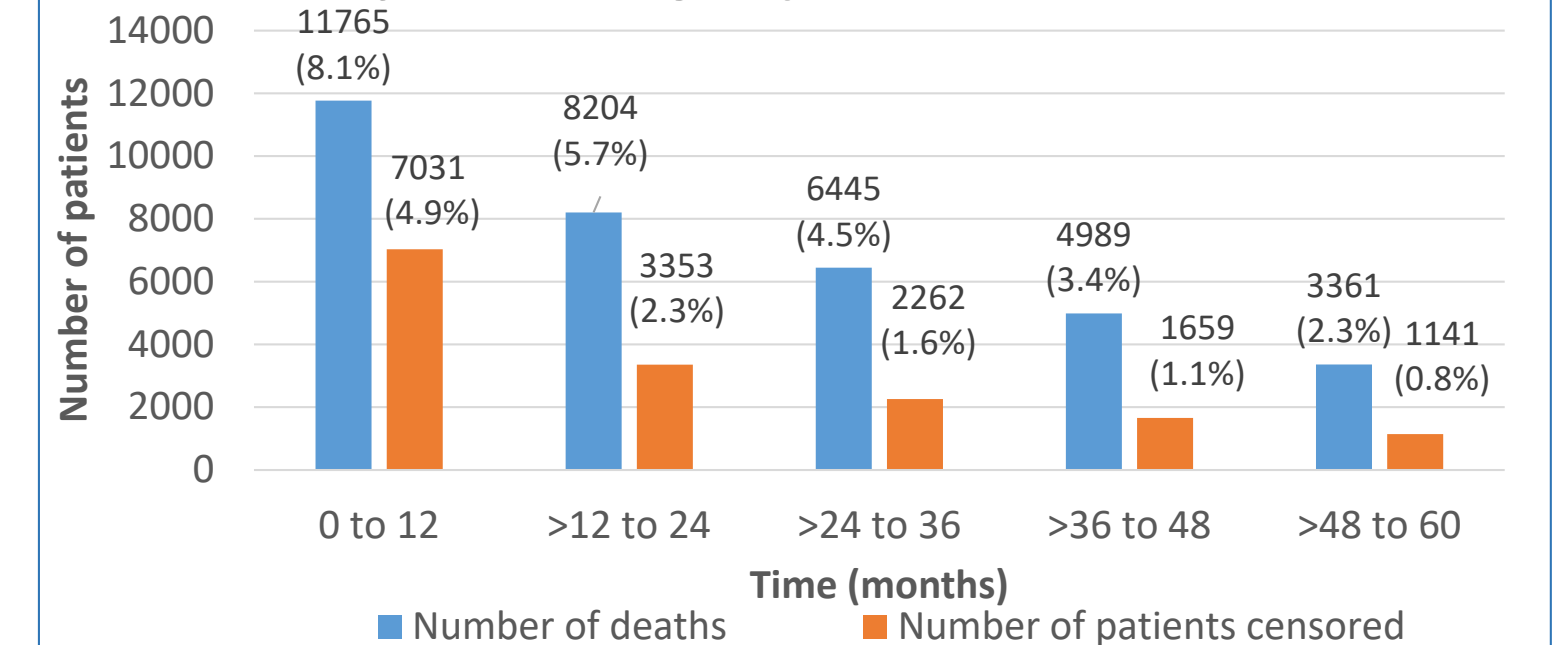
- Rates in males vs females for the first post-index fractures were 996 vs 984 per 10,000 person-year, and for subsequent fractures these were 208 vs 241 per 10,000 person-years.
- Mortality rate for males vs females were 1047 vs 703 per 10,000 person-years (*Figure 6*).

Figure 6. Rates of first post index fracture, re-fracture and mortality per 10,000 person-years



- During follow-up over 5 years, 24% (34,762) of patients died (*Figure 7*).
- 11% (15,446) patients initiated OP treatment (*Figure 7*) and 1% (1,929) were lost to follow-up due to other reasons.

Figure 7. Number of patients who died during follow up and who were censored after starting any OP treatment



- OP care and fragility fractures directly contributed to a cost burden of €300 million during the follow up period.

CONCLUSIONS

- In this elderly OP cohort, (representative of the German population), 1 in 3 suffered a fragility fracture and OP medication use was low in those experiencing a fragility fracture. Furthermore, a large proportion used medications such as glucocorticoids that has a negative impact on bone health.
- Costs associated with fragility fractures were significant, €300 million. The burden for patients and societal costs may be reduced through systematic OP diagnosis and appropriate treatment strategies.

REFERENCES

- Hadji P et al. Dtsch Arztebl Int. 2013; 110(4):52-7.
- Data on file. 2018. Fragility Fractures in Germany. Burden, management and opportunities: EU6 Summary Final Report 2018-06-26. <https://www.iofbonehealth.org/broken-bones-broken-lives>

DISCLOSURES

This study was funded by Amgen (Europe) GmbH, and conducted independently by Certara. AK and UD are employees of Certara. ED, GW and DAK are employees of Amgen and hold Amgen shares. WB received consultancy fees from Amgen (Europe) GmbH.

Figure 1: Study design schema

