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Original article

Real-world care for individuals aged over fifty with fractures in France: Evidence for a wide care gap–The EPIFRACT Study

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ABSTRACT

Objectives: To describe the care trajectories of adults aged ≥ 50 years with fragility fractures in France.
Methods: A postal questionnaire was sent to 15,000 individuals aged ≥ 50 years extracted from a representative panel of the French population (METASKOPE) in April-May 2018. Respondents experiencing a single fragility fracture in the previous three years constituted the study population. Information was collected regarding diagnosis, hospitalisations, physician visits and treatment related to the fractures.
Results: 13,914 participants returned a questionnaire (92.8%), of whom 436 reported a single fragility fracture. Their mean age was 68.7 ± 10.3 years. 11.9% of this sample had undergone bone densitometry (DXA) prior to the fracture and 11.9% had received a diagnostic of osteoporosis. Following the fracture, a further 17.4% underwent DXA and 8.5% were diagnosed with osteoporosis. 74.3% of fractures were initially managed in an emergency department and 29.6% led to immediate hospitalisation. Prior to fracture, 3.4% received a specific anti-osteoporotic treatment, 10.1% vitamin D and 6.4% calcium supplementation. After the fracture, these figures rose to 10.8%, 26.8% and 19.0% respectively. 86.2% participants made at least one follow-up visit to a physician.
Conclusions: The rate of DXA screening following fragility fractures in subjects over fifty is very low. Most patients with fragility fractures did not receive a diagnosis of osteoporosis. The proportion of patients treated with a specific anti-osteoporotic treatment after a fracture is low even though around half consulted their general practitioner after the fracture. Practice guidelines are thus not being adhered to in everyday clinical practice in France.

1. Introduction

Fragility fractures due to osteoporosis are an important cause of mortality, morbidity, impaired quality of life and loss of autonomy in people aged over fifty [1–5]. It has been estimated that almost four million osteoporotic fractures occurred in the European Union in 2010, at a cost of around €40 billion to the health services [6]. For these reasons, prevention and appropriate management of osteoporotic fractures are important public health issues both at the individual and at the societal level.

International practice guidelines for the diagnosis of osteoporosis and the prevention of fragility fractures in post-menopausal women have been available for over twenty years [7], notably highlighting the importance of dual-energy X-ray absorptiometry (DXA; densitometry) in diagnosis, individual risk assessment and

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provision of specific treatments to prevent bone resorption. The first French guidelines on the prevention, diagnosis and treatment of osteoporosis were published by the national health authorities in 2003 [8], and guidelines for the use of DXA and the conditions for its reimbursement published in 2004 [9] and in 2006 [10]. Comprehensive guidelines were published in 2012 [11], and updated in 2018 [12], by the Bone Task Force of the French Society for Rheumatology (SFR) and the Osteoporosis Research and Information Group (GRIO), in collaboration with relevant national professional bodies (*Collège National des Généralistes Enseignants*, *Collège National des Gynécologues et Obstétriciens Français*, *Fédération Nationale des Collèges de Gynécologie Médicale*, *Groupe d'Étude de la Ménopause et du Vieillissement Hormonal*, *Société Française de Chirurgie Orthopédique*, *Société Française d'Endocrinologie*, *Société Française de Gériatrie et de Gérontologie*). These guidelines recommend performing DXA for all individuals having experienced a fragility fracture. A condition of reimbursement is that the findings of the DXA examination could lead to a modification of the therapeutic management of the patient [10]. In this context, specific anti-osteoporosis treatments are recommended for all individuals having experienced a major fracture with objective low bone mineral density (or osteopenia) (T score ≤ 1) and for those having experienced a minor fracture with a T score ≤ 2. Calcium and vitamin D supplementation is recommended for individuals if deficiency has been demonstrated [12].

Little information is available concerning whether these guidelines are actually followed in clinical practice in France. Two observational studies performed in 2005 [13] and 2008 [14] using a very similar methodology in physicians managing postmenopausal women who had been diagnosed with osteoporosis showed that the proportion of the women who had experienced a fracture and who were offered DXA rose from 24.1% in 2005 to 65.9% in 2008. Around the same time (2006), a survey of postmenopausal women in the French general population revealed that 61% of women who had been diagnosed with osteoporosis were receiving a specific anti-osteoporosis treatment [15]. These studies are now over a decade old and were conducted in samples of women with a known diagnosis of osteoporosis. A more recent (2011-2013) analysis of DXA in patients hospitalised for fragility fractures from the French national hospital database has indicated that DXA is offered to < 10% of patients and that this prescription rate is declining [16,17]. Moreover, only 25% of patients offered DXA were prescribed a specific anti-osteoporotic treatment [16].

These findings suggest that there is a major treatment gap between practice guidelines and real-world secondary fracture prevention particularly in France, which merits further documentation. Given the limits of randomised clinical trials for accurately representing the heterogeneity and complexity of medical care in a real-world context, naturalistic observational studies have become increasingly important to inform decision-making in healthcare systems.

In order to address real-world management of fragility fractures in France, a non-interventional survey (EPIFRACT study) was performed in a large panel of people aged over fifty in France.

2. Methods

The EPIFRACT study was performed as a postal survey in a representative sample of the French general population. The fieldwork lasted for five weeks in April-May 2018. The survey was implemented by Kantar Health (Paris, France), an international health care market research organisation. A multidisciplinary Scientific Committee of rheumatologists, public health specialists, orthopaedic surgeons, epidemiologists and patient representatives was appointed to oversee the design and implementation of the study and advise on data interpretation.

2.1. Participants

Study participants were members of the METASKOPE panel, a permanent sample of 20,000 households constituted on a voluntary basis to answer regular questionnaires related to health or other topics of interest. It is selected to be representative of the French population by quotas, based on the distributions of age group, gender, occupational class, region and population size of municipality of residence, according to the French national statistics office. Participation in the panel is limited to ten years and members who repeatedly fail to reply to questionnaires or no longer wish to participate are replaced on a regular basis. When individuals join the panel, extensive sociodemographic data is collected. Each month, members of the panel are addressed a questionnaire to complete on one or more subjects. Members receive 'loyalty points' for completing questionnaires, which can be exchanged for gifts at the end of each year. This panel has been used widely in medical research to collect medical data, for example in the regular ObEpi studies of the epidemiology of obesity in France [18], and has provided reliable information consistent with that obtained from other sources [19,20].

2.2. Study questionnaire

For the purposes of the EPIFRACT study, the monthly questionnaire was only sent to the 15,000 households with at least one person aged at least fifty years. If more than one household member was aged ≥ 50 years, then each was invited to complete a questionnaire. This was the case for seven of the households in the panel. The questionnaire only contained the questions about fragility fractures specifically developed for the EPIFRACT study. The study questionnaire was sent by post and addressed by name. The questionnaire consisted of up to 62 questions. Responses were elicited in the form of multiple choice replies in the majority of cases, although some questions provided the possibility of free-text replies.

2.3. Identification of participants with osteoporotic fractures

Participants were asked whether they had experienced a fracture in the previous three years. Participants responding that this was not the case terminated the questionnaire at this point. The remaining participants then answered a further series of questions on the nature of the fracture, fracture management, quality of life, risk factors and osteoporosis. For participants who had experienced more than one fracture event, they were asked to document each, up to a maximum of three. In order to distinguish fragility fractures from others, participants were asked in what circumstances the fracture had occurred. Four responses were possible, namely:

- falling over;
- a spontaneous fracture without trauma;
- as a result of an accident on a public highway;
- in other circumstances, which the participant was asked to provide in the form of free text.

Participants responding (1) or (2) were considered to have fragility fractures and those responding (3) not to have fragility fractures. Subjects who responded (4) were individually adjudicated by the Steering Committee of the study. Fractures of the toes, hands, head or neck were not considered to be fragility fractures. Fragility fractures were then subdivided into major and minor fractures. Fractures to the humerus, vertebrae, pelvis, hip or femur and concurrent fracture of three or more ribs were considered to be major fractures, these being associated with increased mortality [4,12]. In cases where a respondent indicated having more than one fracture site for the same fracture event, the following rule

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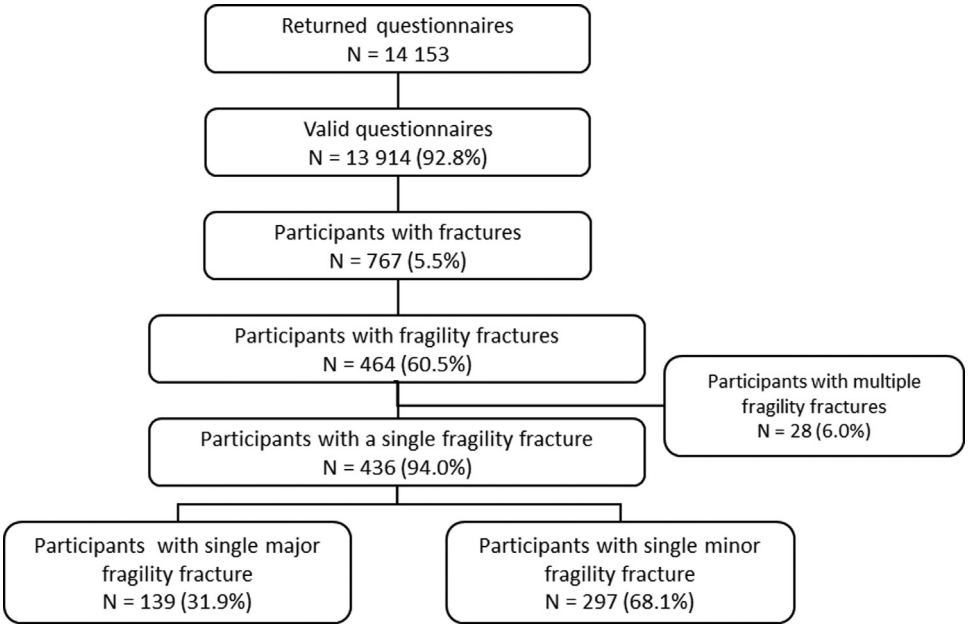

Fig. 1. Distribution of participants. All percentages are calculated with respect to the number in the previous line.

was applied: if at least one fracture site was major, then the event is classified as major, if not the event is classified as minor. Participants with multiple fractures were excluded from the present analysis as multiple fractures can suggest a high trauma.

2.4. Data collection on fracture management

Information was collected on where the participant sought care after a fracture, if they were referred elsewhere following this first contact, whether they were hospitalised for overnight hospitalisation and their destination on discharge from hospital. Information was collected on physician and paramedical consultations following the fracture, risk factors for fracture, on diagnosis of osteoporosis, prescription of bone densitometry (dual-energy x-ray absorptiometry; DXA) and on prescription of anti-osteoporotic medication and non-pharmacological interventions aimed at preventing further fractures. Anti-osteoporotic medication was classified into vitamin D supplementation, calcium supplementation and specific anti-osteoporotic drugs (bisphosphonates, denosumab, teriparatide, strontium ranelate or raloxifene).

2.5. Statistical Analysis

In terms of socio-demographic variables, the structure of the sample was very similar to that of the French general population aged ≥ 50 years in 2017, as described in reference data was obtained from the French National Statistics Office (INSEE) [21]. For this reason, no adjustment of the sample was made to ensure representativeness. Missing data were not replaced. Certain categorical variables were compared between participants with major fractures and participants with minor fractures using the χ^2 test.

Data were controlled, validated and analysed centrally. Data was analysed using Dasie software (AND Soft) version 2.4.84 for descriptive and bivariate analyses. Multivariate analysis was performed using R for Windows version 3.0.1 i386 software (R Foundation for Statistical Computing, Vienna, Austria).

2.6. Ethics

The survey was conducted in accordance with the ESOMAR International Code on Market and Social Practice, the EphMRA Code of Conduct, relevant current French and European legislation, and Good Epidemiological Practice guidelines. Analyses performed using the Kantar Health panel have been approved by the Commission Nationale de l'Informatique et des Libertés (CNIL). In addition, before answering the questionnaire, panellists had to confirm their agreement for the collection and analysis of data about their health.

3. Results

3.1. Study sample

A total of 14 153 (94.4%) members of the METASKOPE panel returned a study questionnaire. Of these questionnaires, 239 were eliminated because they were not completed ($N = 68$), because the participant did not wish to participate ($N = 135$) or because they were unexploitable ($N = 36$). The remaining 13 914 (92.8%) were retained and formed the study sample. Overall, 767 participants (5.5%) reported having experienced at least one fracture in the previous three years. In 464 participants (60.5%), the fracture fulfilled criteria for a fragility (osteoporotic) fracture. In order to avoid any ambiguity about which fracture was being considered, experiencing multiple fragility fractures ($N = 28$) were excluded from the analysis. The remaining 436 participants constitute the analysis population. The distribution of the participants is presented in Fig. 1. The sociodemographic characteristics of the analysis population are presented in Table 1.

The most frequently reported fracture sites for the 436 participants with a single fragility fracture were the forearm/wrist ($N = 116$; 26.6% of all fragility fractures), the ankle ($N = 82$; 18.8%), the distal humerus or elbow ($N = 53$; 12.2%), and the proximal humerus ($N = 45$, 10.3%). In 139 participants (31.9%), the fractures were considered major, principally of the proximal humerus, vertebrae and hip. In the remaining 297 participants (68.1%), the fractures were considered minor.

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Table 1
Sociodemographic features characteristics of the METASKOPE panel and the analysis population.

	Analysis population (Participants with a single fracture) (*N* = 436)
Age (years)	
50–54 years	32 (7.3%)
55–64 years	132 (30.3%)
65–74 years	155 (35.6%)
≥ 75 years	117 (26.8%)
Mean age (±SD)	68.7 ± 10.3
Gender	
Men	100 (22.9%)
Women	336 (77.1%)
Population size of municipality	
<2 000 inhabitants (rural)	91 (20.9%)
>2 000 inhabitants (urban)	345 (79.1%)
Occupation	
Retired	311 (71.3%)
In employment	109 (25.0%)
Not working/Inactive	16 (3.7%)

3.2. Diagnosis and treatment of osteoporosis prior to the fracture

Prior to the fracture, 52 participants (11.9%) had undergone DXA for diagnosis of osteoporosis sometime in the past. This occurred on average 20.8 ± 12.1 months before the fracture (median: 15 months; range: 2–43 months). Fifty-two participants (11.9%) had received a diagnosis of osteoporosis from their general practitioner. Prior to the fracture, fifteen participants (3.4%) were being treated with a specific anti-osteoporotic medication. Forty-nine participants were receiving dietary supplementation either with vitamin D, with calcium or both (44 received vitamin D, 28 received calcium).

3.3. Hospitalisation following the fracture

The pathway to hospitalisation for participants with major and minor fractures is illustrated in Fig. 2. In 288 cases (66.1%), participants went directly to the accident and emergency department. In 137 cases (31.4%), they consulted a community physician, principally their GP (115 cases), who referred them, in 36 cases, to the Accident and Emergency Department (A&E). In all, 178 participants were hospitalised, 129 immediately and 49 at a later date for surgery. Forty-five hospitalisations (25.3%) were in private clinics and 131 (73.6%) in public hospitals. Most hospitalisations required an overnight stay (*N* = 151; 84.8%) and the length of stay was less than five days in 104/178 cases (58.4%). Overall, 142 participants underwent orthopaedic surgery, which was performed within 24 hours of admission in 62 cases (43.7%). During the hospital stay, eight (4.5%) participants saw a rheumatologist, four (2.2%) saw a geriatrician and eleven (6.2%) saw a rehabilitation physician. Following hospitalisation, 135/178 participants (75.8%) went back home, or stayed with friends or relatives, and 43 (24.2%) moved to a rehabilitation centre or nursing home.

The point of first medical contact differed significantly (*P* = 0.02) between participants with major fractures and those with minor ones. Participants who experienced major fractures more frequently consulted a community physician initially than those with minor fractures, whereas the latter more frequently failed to consult at all. Participants with major fractures were more frequently hospitalised (*P* < 0.001) and more frequently underwent orthopaedic surgery (*P* = 0.049). Participants with major fractures were more frequently discharged into a rehabilitation centre or to a convalescent home (*P* < 0.0001).

3.4. Consultations following the fracture

Interventions between the time of the fracture and the end of the three-year follow-period were documented. Overall, 376 (86.2%) participants made at least one follow-up visit to a physician following their fracture, 239 participants (54.8%) consulted their GP, 270 (61.9%) returned to the hospital, and 68 (16.0%) consulted a community-based specialist (Table 2). Forty-nine participants (11.0%) consulted a rheumatologist, either at a hospital (21 participants) or in community practice (28 participants). Participants with major fractures more frequently consulted a rheumatologist than those with minor fractures (*N* = 26; 18.7% versus *N* = 23; 7.7%; *P* = 0.0001).

3.5. Non-pharmacological interventions and counselling

The number of participants receiving non-pharmacological interventions or counselling is presented in Table 3. Following the fracture, 70.4% of participants attended physiotherapy sessions, with no difference between participants with major or minor fractures (*P* = 0.30). On the other hand, participants with major fractures more frequently underwent a blood test for determination of serum calcium and vitamin D levels (*P* < 0.0001), received advice on fall prevention (*P* = 0.0005) and nutrition (*P* = 0.019), and received fall prevention therapy (*P* = 0.10) (Table 3). Fall risks were evaluated in < 5% of participants.

3.6. Diagnosis

Seventy-six participants (17.4%) were prescribed DXA following the fracture and 66 of these (86.8%) underwent the test. DXA was prescribed principally by a GP (35 tests; 46.1%), a rheumatologist (19 tests; 25.0%), a gynaecologist or an orthopaedic surgeon (6 and 7 tests respectively). Prescription rates of DXA were similar for patients living in rural or urban areas. Thirty-seven (8.5%) participants reported that had received a diagnosis of osteoporosis from their physician subsequent to their fracture. Compared to those with minor fractures, participants with major fractures were more likely to have been prescribed DXA (38.1% versus 25.5%; *P* = 0.005) and to have received a diagnosis of osteoporosis (32.4% versus 17.2%; *P* = 0.0003).

3.7. Medication

Following the fracture, 32 participants (7.3%) were prescribed a specific anti-osteoporotic treatment for the first time, and a further 108 (24.8%) started dietary supplementation with calcium or vitamin D (Fig. 3). The proportion of participants prescribed a specific anti-osteoporotic medication after the fracture was significantly higher in participants experiencing major fractures (12.2% compared to 5.0% in participants experiencing minor fractures; *P* = 0.007), and the same was true for the proportion of participants either taking a specific anti-osteoporotic medication or receiving dietary supplementation (or both) after the fracture (35.9% versus 19.5%; *P* = 0.0002). No difference in the prescription rate of specific anti-osteoporotic treatments was seen between patients living in rural and urban areas. Overall, only 10.8% (*N* = 47) of participants were treated with a specific anti-osteoporotic treatment either started before or after the fragility fracture.

4. Discussion

This survey of people living in France aged at least fifty years who experienced osteoporotic fragility fractures revealed that less than one-third of participants were prescribed a DXA after a fragility fracture and less than 15% received a specific treatment (Fig. 3).

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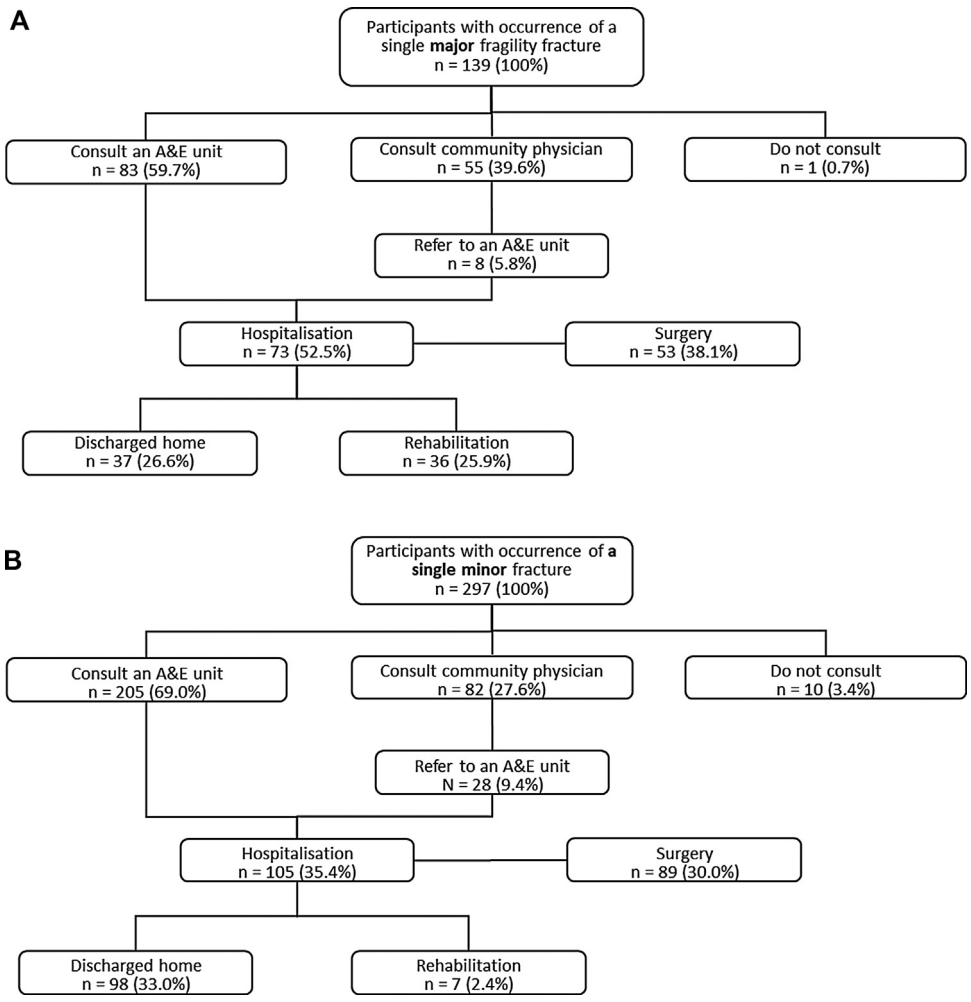

Fig. 2. Hospitalisation pathway following a fragility fracture. A. Major fractures. B. Minor fractures. Percentages are in all cases calculated with respect to the total number of participants with a fragility fracture. A&E: Accident and Emergency Unit.

Table 2
Follow-up consultations.

	All patients with a single fracture event ($N = 436$)		
	GP	Hospital	Community specialist
At least one consultation	239 (54.8%)	270 (61.9%)	68 (15.6%)
Mean number of consultations ± SD	2.64 ± 1.64	2.67 ± 1.72	2.62 ± 2.15
Median number of consultations [range]	2 [1–11]	2 [1–13]	2 [1–12]
Medical speciality			
Orthopaedic surgery		225 (51.6%)	28 (6.4%)
Rheumatologist		21 (4.8%)	28 (6.4%)
Radiologist/medical imagery		12 (2.8%)	10 (2.3%)
Neurologist		4 (0.9%)	2 (0.5%)
Geriatrician		2 (0.5%)	2 (0.5%)

Table 3
Acts and procedures following the fracture.

	All fractures $N = 436$	Major fractures $N = 139$	Minor fractures $N = 297$
Measure of serum Vitamin D and calcium	105 (24.1%)	51 (36.7%)	54 (18.2%)
Physiotherapy sessions	307 (70.4%)	95 (68.3%)	212 (71.4%)
Evaluation of fall risk	11 (2.5%)	4 (2.9%)	7 (2.4%)
Fall prevention therapy	37 (8.5%)	19 (13.7%)	18 (6.1%)
Advice on fall prevention	54 (12.4%)	29 (20.9%)	25 (8.4%)
Advice on nutrition	52 (11.9%)	24 (17.3%)	28 (9.4%)
Advice on physical activity	75 (17.2%)	31 (22.3%)	44 (14.8%)

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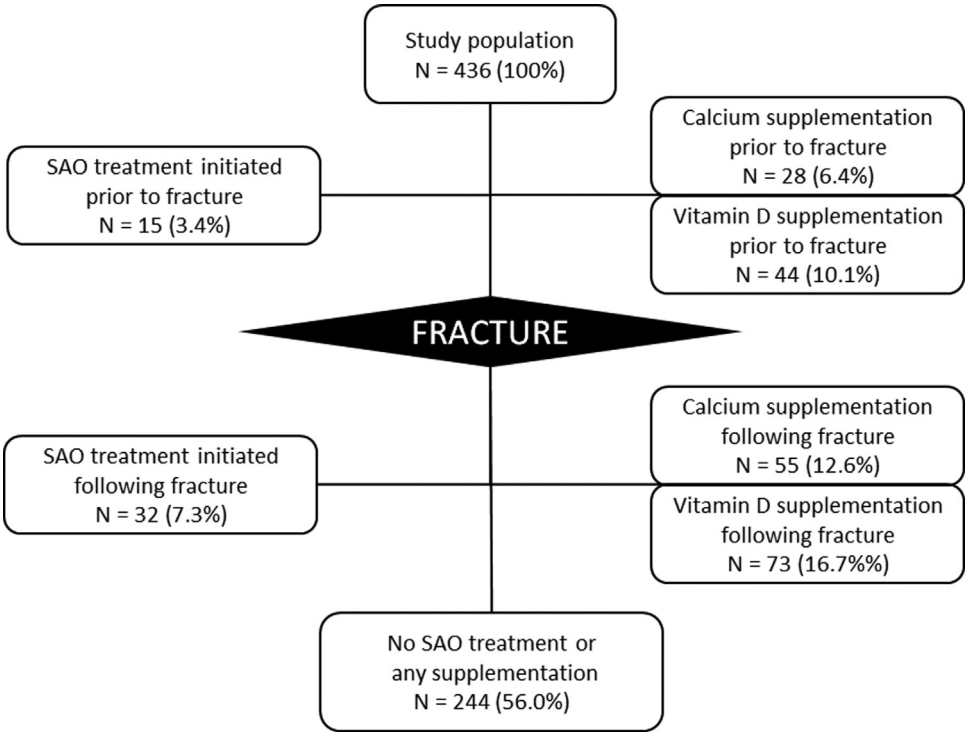

Fig. 3. Anti-osteoporotic treatments in participants experiencing a fragility fracture. SAO: specific anti-osteoporotic treatment.

Although osteoporosis is the most likely explanation for these fractures, the majority of people who experience them never have their bone density measured, never receive a diagnosis of osteoporosis and never get prescribed a treatment. This unsatisfactory situation exists in spite of the fact that >95% of individuals who experience a low trauma fracture seek medical advice and >85% return for a follow-up consultation after the initial fracture management. Although better management is offered to individuals experiencing major fragility fracture than in the case of minor fractures, the overall uncovered need remains significant.

The care trajectories followed differed according to the type of fracture. In participants with major fragility fracture, community physicians were more frequently the first medical contact (39.6% vs. 27.6%, $P=0.002$) and admissions to A&E unit were lower (65.5% vs. 78.5%, $P=0.004$) compared to participants with minor fractures. Participants with major fractures were more often hospitalised (52.5% vs. 35.4%, $P<0.001$), their stays were longer (more than 5 days: 71.2% vs. 21%, $P<0.0001$) and they were more frequently discharged to a rehabilitation centre or a convalescent home (25.9% vs. 2.4%; $P<0.0001$).

The limiting steps for access to adequate care seem to be prescription of diagnostic tests for osteoporosis. Although most participants experiencing a fracture consult a physician (either their GP or an A&E physician), only one third are prescribed DXA and receive a diagnosis principally made by a GP. Indeed, the proportion of participants who undergo DXA, receive a diagnosis of osteoporosis and are prescribed an anti-osteoporosis treatment is very similar. These may well be the same individuals, since data from earlier studies in France have shown that the majority of people with a fracture history who already have a diagnosis of osteoporosis are prescribed a DXA and a specific anti-osteoporotic medication [14,15]. The low rates of diagnosis and treatment are consistent with data from the French national health insurance database, in which less than 10% of people hospitalised for a fragility fracture between 2011 and 2013 underwent DXA within a year of hospitalisation, and only one quarter of those evaluated received a specific anti-osteoporotic medication [12,17].

A number of proposals can be made to ensure better care for people over fifty experiencing fragility fractures. For example, medical teams in A&E units, which are where three-quarters of fracture cases consult, could systematically encourage all individuals with fragility fractures to return to their GP to discuss a possible diagnosis of osteoporosis. In addition, for individuals who are hospitalised for orthopaedic surgery or observation, a future appointment for DXA could be organised during their hospital stay. In this context, fracture liaison services (FLS) based in the hospital can play a key role in coordinating care between hospital and community medicine and offer dedicated personnel to ensure that secondary fracture prevention measures are implemented [22,23]. The utility of FLS in reducing future fracture risk and adverse health outcomes has been demonstrated in many types of health system [24] [25], but still remains the exception in France. In addition to these specific measures, educational programmes could be directed at GPs or other community specialists who see these individuals, such as gynaecologists or geriatricians, to encourage them to ensure that their patients who report experiencing a fragility fracture undergo bone densitometry and are evaluated. In France, the government recently (2018) announced a healthcare programme which includes actions to combat osteoporosis aimed at creating a coordinated care pathway to reduce the burden of osteoporotic fragility fractures [26]. If such coordinated care pathways are indeed established in the majority of hospitals, then it is to be hoped that the long-term management of osteoporosis will improve.

The EPIFRACT study has a number of strengths and limitations. The strengths include the large number of individuals sampled, the very comprehensive nature of the questionnaire, the high response rate (>95%) and the general population context of the study. Limitations include the unknown reliability of self-report for medical variables in this elderly population and the lack of clinical

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ascertainment of the information collected. In addition, the study sample was limited to people living at home. Elderly people living in residential homes or nursing homes may follow different care trajectories to independent individuals living at home. In particular, participants experiencing hip or femur fractures may be under-represented, since they may move to sheltered accommodation or nursing home after their fracture. Finally, information on whether participants were taken in charge by an FLS was not collected and the impact of the FLS on post-fracture management could not be determined.

In conclusion, this study reveals that practice guidelines for the prevention and management of osteoporotic fractures are not being followed in everyday practice in France. Measures are urgently needed to improve standards of care and thus reduce the burden of osteoporotic fractures.

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Disclosure of interest

JMJ and LP are employees of UCB Pharma S.A., France. KB has received consultancy honoraria and conference fees from UCB Pharma S.A., Amgen, Lilly and MSD. LG has received honoraria from Amgen, Lilly and UCB Pharma S.A. and research support from Lilly, Amgen, UCB Pharma, Expanscience, Mylan, Roche diagnostics and TEVA. BC has received consultancy honoraria of speaker's fees from Amgen, Expanscience, Ferring, Lilly, Medtronic, MSD, Novartis, Roche diagnostics, Théramex and UCB Pharma S.A. JMF has received consultancy honoraria and conference fees from UCB Pharma S.A., Amgen and Lilly. The other authors declare that they have no competing interest.

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