



Research Article

# Using Best and Worst Scaling for Eliciting the Most Important Barriers and Expectations to Improve the Quality of Care in Secondary Prevention of Osteoporosis in France

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## Abstract

**Context:** Osteoporosis is a common, serious and costly illness. It is underdiagnosed and undertreated. It has been estimated that only around one-fifth of individuals experiencing a fragility fracture benefit from an anti-osteoporotic treatment. **Objectives:** To provide a quantitative evaluation of barriers and expectations with respect to management of osteoporosis perceived by people with fragility fractures. **Methods:** The study included a qualitative and a quantitative part. In the qualitative part, potential barriers and expectations were identified from a systematic literature review, semi-structured interviews with people with fragility fractures, and focus groups. In the quantitative part, these items were tested in 324 people with fragility fractures drawn from a general population sample using best-worst scaling questionnaires. Mean importance scores were generated for each item, which were then ranked. Latent class analysis was performed to identify profiles of panellists with specific patterns of response. **Results:** In the qualitative part, 21 barriers and 21 expectations were identified. In the quantitative part, seven barriers were rated the most important, relating to awareness of osteoporosis and coordination of care. The highest-ranked barrier, "my fracture is not related to osteoporosis", was significantly more important than all the others. Latent class analysis identified three classes of respondents with major differences in responses to certain items. It was not possible to establish a meaningful hierarchy for the 21 expectation items. **Conclusion:** From the patient's perspective, two groups of factors seem to contribute to the care gap in osteoporosis, namely lack of understanding of osteoporosis and the organisation of care provision. Perceptions vary between patients and this needs to be taken into consideration when designing healthcare strategies to improve the quality of care in osteoporosis.

**Keywords:** Osteoporosis; Fracture; Prevention; Quality of care; Quali-quantitative study; Attribute identification; Preference elicitation methods; Best-worst scaling; Latent classes analysis

## Introduction

Osteoporotic fragility fractures are common, with around 3.5 million new fractures occurring annually in the European Union [1] with an estimated economic burden of € 37 billion in 2010 [1]. These fractures are frequently only managed by surgery or immobilisation with a cast, without any further investigation or prescription of appropriate anti-osteoporosis treatment [2]. This is of particular concern due to the increased probability of re-fracture following an osteoporotic fracture [3,4] as well to the elevated mortality risk following certain types of fracture [5-8]. The gap between best standards of care for osteoporotic fractures and everyday clinical practice has been demonstrated in many different countries and healthcare systems [7,9-13]. Narrowing this gap and improving standards of care is an important public health challenge, which requires a clear vision of the barriers that prevent patients with osteoporosis from receiving the quality of care that is recommended in practice guidelines [14]. Barriers to a better standard of care may exist at the level of care organisation [2,15,16], at the level of knowledge and attitude of physicians [17-19] and at the level of patients' perceptions [20,21]. Although the first two levels have been widely studied, there is relatively little information available, particularly quantitative information, on the perspective of the patient. In this context, we have implemented a research programme to collect information on the experiences and expectations of patients who have experienced an osteoporotic fracture regarding to secondary prevention for osteoporosis.

## Methods

In a first qualitative phase of the study, a literature review was performed and patients who had experienced an osteoporotic fracture were interviewed in extenso by trained investigators in order to identify potential barriers to care and expectations for change. In the second quantitative phase, individuals who had experienced an osteoporotic fracture were sent a questionnaire asking them to rank the importance of each of the items identified in the first phase using the Best and Worst scaling (BWS) method [22]. A scientific committee consisting of rheumatologists, health economists, methodologists and a patients' association representative oversaw the design and implementation of the study.

## Participants

For the qualitative phase of the survey, 24 patients with a recent osteoporotic fracture (including hip or vertebral fractures) were identified by the French patient association (*Association Française de Lutte Anti-Rhumatismale*; AFLAR). These individuals were volunteers chosen to include a range of patient profiles in terms of

age, gender, education, socioeconomic status, education, access to care (rural/urban) and type of fracture.

For the quantitative phase, members of the METASKOPE panel were contacted. METASKOPE is a permanent sample of 20,000 volunteer households constituted by the quota method to be representative of the French population with respect to principal sociodemographic variables. The panel is used to collect information about health or other topics of interest using questionnaires. Individuals in the METASKOPE panel who reported experiencing a non-traumatic fragility fracture within the preceding three years had been identified in a previous study [23] and these were sent the study questionnaire by post. These individuals make up the study panel. In case of failure to return the questionnaire or incoherent or missing data, a follow-up telephone call was made.

## Qualitative phase: identification of barriers and expectations

An iterative process was used to identify items potentially related to barriers to care or health expectations [24]. First of all, a literature review was performed in order to understand perceptions of fracture victims regarding expectations from fracture management and to barriers preventing their expectations being met [22,23,25,26]. The recommendations of the 2009 PRISMA statement for performing systematic reviews [27] were followed.

In the next step, semi-structured individual interviews were conducted with the 24 patients who had experienced a fracture. Patients were chosen based on their experience with or knowledge of the condition; they were not representative or randomly selected but were included because they exemplified key cases or possessed in-depth knowledge of the area being explored. The goal was to recruit a broad patient sample in order to capture as wide a range of individual patient experience as possible and to minimise the chances that important themes were missed (purposive sample), rather than to aim for representativeness with respect to the osteoporosis population in general. For this reason, the panel was chosen to include a range of patient profiles typical of patients with osteoporosis in terms of age, gender, socioeconomic status, education, access to care (rural/urban), type of fracture and treatment.

The sample size was determined by the principle of saturation, with participants included as long as they provided new, relevant information. Individual semi-structured interviews were conducted by independent professionals based on an interview grid built from the literature review. The interview method was somewhere between a free (or non-directive) interview, where a general question allows the respondent to answer at length, and a structured interview, where short, closed questions are asked in a fixed order. A content analysis was performed on the collected

verbatim derived from transcripts of the interviews. Themes were not identified in advance and were derived from the recorded data. Concepts were grouped by theme by the data analyst. No formal coding system was used.

Finally, two focus groups brought together six and five patients designated by the AFLAR patient association to ensure no major theme was forgotten. The scientific committee then finalised the final item list to a set of 21 barriers and 21 expectations and validated the wording.

### **Quantitative phase: experimental design and rating of items**

During the quantitative phase, panellists were asked to rate the relative importance of the items on the checklist using the BWS method [22]. In order to limit attention difficulties for the panellists, three separate questionnaires were constructed, each presenting seven choice tasks for barriers and seven tasks for expectations. In each choice task, participants had to choose the item of five items presented that they considered the most important (best) and the one they considered the least important (worst). The questionnaires were constructed using a balanced incomplete blocks design [28]. To avoid any selection bias in responses, the same total number of items was evaluated across the three questionnaires. The three questionnaires were randomly attributed to the panellists, each of whom completed a single questionnaire.

### **Statistical analysis**

The evaluation of the study population is purely descriptive. All statistical analyses were conducted using SAS 9.4 and Excel 2016 software, with the exception of the latent class analysis, which was performed using Sawtooth software (Sawtooth Software, Inc., 2013). A threshold of 5% was considered statistically significant.

### **Priorities**

For each barrier or expectation item, an importance score was computed by subtracting the number of times the item was chosen as the least important from the number of times it was deemed most important. A positive importance score indicates that the item was more often chosen as “best” rather than “worst” and a negative score indicates the reverse. A score of zero indicates that the item was considered best as often as worst, or that none of the panellists ever chose it as best or worst. The mean importance score was then calculated by dividing the individual importance scores by the number of respondents. This metric represents the average importance score for the panellist population and can be ranked on an interval scale to display the hierarchy of importance attached to each item. A high mean importance individual score, associated with a low coefficient of variation, indicates a strong consensus within the group to declare this barrier or expectation as the most important.

### **Preference heterogeneity**

Segmentation of patients was performed using the latent class analysis method in order to identify groupings of participants who provided similar patterns of priorities [29,30]. Only patients for whom both questionnaires were complete for all item-pairs were included in the latent class analysis. The goodness-of-fit of the final model was assessed using the Akaike Information Criterion (AIC). An Analysis of Variance (ANOVA) was performed in order to identify any individual mean importance scores which differed significantly between classes. A post hoc analysis using the Tukey HSD test was then performed to determine whether overall group averages differed significantly between classes.

### **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 METASKOPE panel were approved by the French Data Protection Agency (*Commission Nationale de l'Informatique et des Libertés*; CNIL). In addition, before answering the questionnaire, panellists provided informed consent for the study.

### **Results**

#### **Study population**

In the qualitative phase, 24 patients participated in individual interviews and 11 in focus group discussions. The 24 patients were all women aged from 53 to 88 years (7 aged over 75 years) and came from diverse socioeconomic backgrounds.

In the quantitative phase, the BWS questionnaire was sent to the 464 panellists reporting non-traumatic fractures. Twenty-nine panellists declined to participate, thus reducing the sample to 435 panellists. Overall, 357 questionnaires were returned. A follow-up telephone call was made to 108 panellists in order to correct errors or replace missing data in the questionnaires and corrections were made for 75 questionnaires. In total 324 questionnaires could be analysed. For thirteen panellists, certain item pairs were not rated and these were excluded from the latent class analysis, which was therefore performed using the data from 311 questionnaires. The mean age was 68 years and 78.7% of panellists were women. The most frequently reported fracture locations were the wrist and the ankle.

#### **Qualitative phase: identification of items**

A preliminary systematic review of the literature identified 193 publications discussing barriers to treatment and expectations in osteoporosis. These included two previous systematic reviews of

the same topic [25,26]. 58 potentially relevant items were identified from the literature review and proposed during the individual face-to-face interviews of patients with osteoporotic fractures. From these interviews a list of 42 criteria deemed the most important was derived, including 21 items for barriers and 21 for expectations. Key themes identified in the face-to-face interviews and examples of verbatim are presented in Table 1.

### Quantitative phase: hierarchical rating of items

The relative importance of the different items related to barriers to care is presented in Table 1.

#	Ranking	Barriers (n = 324)	Total				Heterogeneity			
			BEST	WORST	B-W score	B-W Mean Score	SD	CV	Lower Bound	Upper Bound
6	1	My Fracture has no connection to osteoporosis	228	91	137	0.42	1.05	2.5	0.31	0.54
19	2	I don't hear a lot about osteoporosis or its treatment	235	114	121	0.37	1.08	2.9	0.26	0.49
1	3	I choose natural treatments and watch my diet	211	98	113	0.35	1.05	3.0	0.23	0.46
21	4	After my fracture, the hospital didn't contact my doctor to follow up about osteoporosis	168	110	58	0.18	1.06	5.9	0.06	0.29
2	5	I have health problems that are more important than osteoporosis	125	71	54	0.17	0.89	5.3	0.07	0.26
14	6	After my fracture, my doctor advised me of ways to improve my personal health practices and behavior	133	85	48	0.15	0.87	5.9	0.05	0.24
13	7	Mon doctor doesn't see the benefit in an osteoporosis screening after a fracture	102	72	30	0.09	0.75	8.1	0.01	0.17
5	8	I am not at risk for osteoporosis	105	80	25	0.08	0.80	10.4	-0.01	0.16
17	9	After my fracture, no one explained what osteoporosis is or how to treat it	116	99	17	0.05	0.89	16.9	-0.04	0.15
9	10	Medication have no effect on the risk of another fracture	112	111	1	0.00	0.83		-0.09	0.09
12	11	Osteoporosis medication do more harm than good	67	89	-22	-0.07	0.77	11.3	-0.15	0.02
20	12	Osteoporosis medication are not reimbursed in full	96	124	-28	-0.09	0.91	10.6	-0.19	0.01
8	13	I don't know a lot about osteoporosis medications or their efficiency	129	158	-29	-0.09	1.01	11.3	-0.20	0.02
18	14	My doctor disregarded my family members' and my opinions on osteoporosis	28	66	-38	-0.12	0.58	5.0	-0.18	-0.05
7	15	Osteoporosis is painless	107	147	-40	-0.12	0.97	7.8	-0.23	-0.02

10	16	Osteoporosis medication have no effect on my autonomy	49	100	-51	-0.16	0.71	4.5	-0.23	-0.08
4	17	Osteoporosis is not really an illness	54	106	-52	-0.16	0.70	4.4	-0.24	-0.08
3	18	I prefer to ignore my osteoporosis and maintain my daily habits	71	131	-60	-0.19	0.82	4.4	-0.27	-0.10
11	19	Osteoporosis medication are too restrictive	52	130	-78	-0.24	0.80	3.3	-0.33	-0.15
15	20	I don't get along well with my doctor	11	101	-90	-0.28	0.65	2.3	-0.35	-0.21
16	21	I have no psychological support in the management of osteoporosis	60	176	-116	-0.36	0.88	2.5	-0.45	-0.26

**Table 1:** Best-Worst Case Analysis of Barriers.

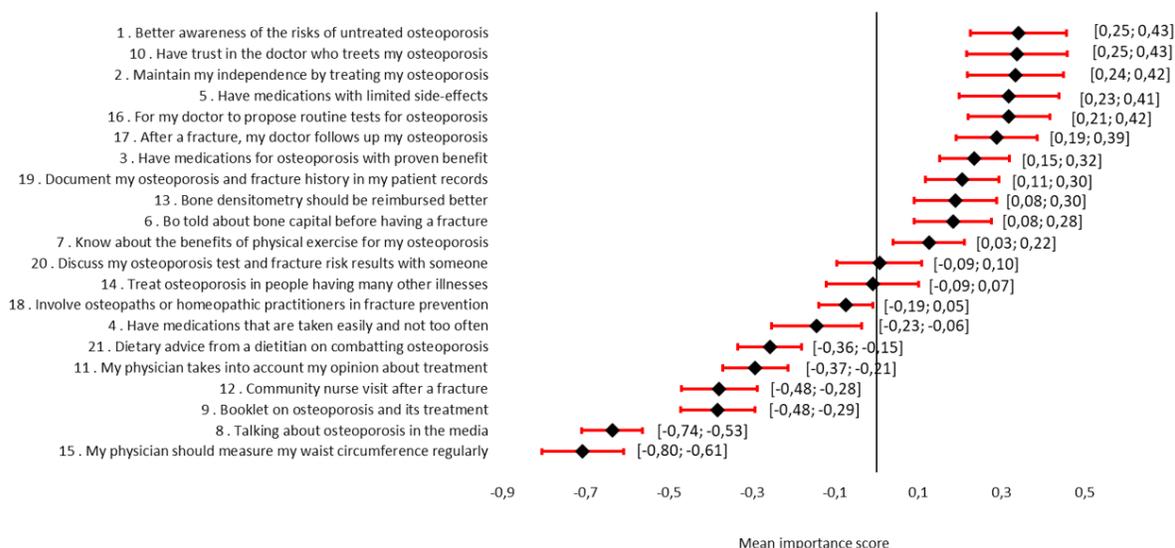
Mean importance scores ranged from -0.36 to +0.42, although the 95% confidence intervals were all rather broad, given the limited number of panellists scoring each item. For seven items, the score was significantly higher than zero, indicating that these items were considered to be important by panellists. Three items stood out as having particularly high scores (between 0.35 and 0.42), with Item 6 (*My fracture has nothing to do with my osteoporosis*) being the most important, followed by Items 19 (*You do not hear enough about osteoporosis and its treatment*) and Item 1 (*I prefer to take natural treatments and pay attention to what I eat*). The other items with a score significantly higher than zero were Items 21, 2, 14 and 13, which all relate to dysfunctions in the healthcare system. However, the confidence interval of Item 6 did not overlap those of the items from Item 21 to Item 13, indicating that it is significantly more important than these items. Item 13 was also rated as significantly less important than Items 6, 19 et 1.

For eight items (N°8 18, 7, 10, 4, 3, 11, 15 and 16), the score was significantly lower than zero, indicating that these items were considered to be relatively less important by panellists. The least important obstacle was Item 16 (*I do not have psychological*

*support for the management of my osteoporosis*) and its confidence interval did not overlap with the seventeen highest-ranked items, indicating that it was significantly less important than the latter.

Considering the inter-items ranking the most important obstacle were Item 6 followed by Item 13 and 11. The confidence intervals of those item overlapped, indicating that respondents did not differentiate between the importance of the 3 obstacles. The confidence interval for Item 6 did not overlap with any of the 18 lowest-ranked obstacles, indicating that respondents differentiated significantly the importance of this obstacle from the latest and specifically from Items 21, 2, 14 et 13 describing the dysfunctions in the healthcare system. The least important obstacle was Item 16 "I do not have a psychological support" and its confidence interval did not overlap with the 16 highest-ranked item indicating that it was significantly less important than those.

With respect to expectations for care, values ranged from -0.71 to 0.34, although there was considerable overlap between coefficients of variation, which precludes unambiguous ranking of the items (Figure 1).

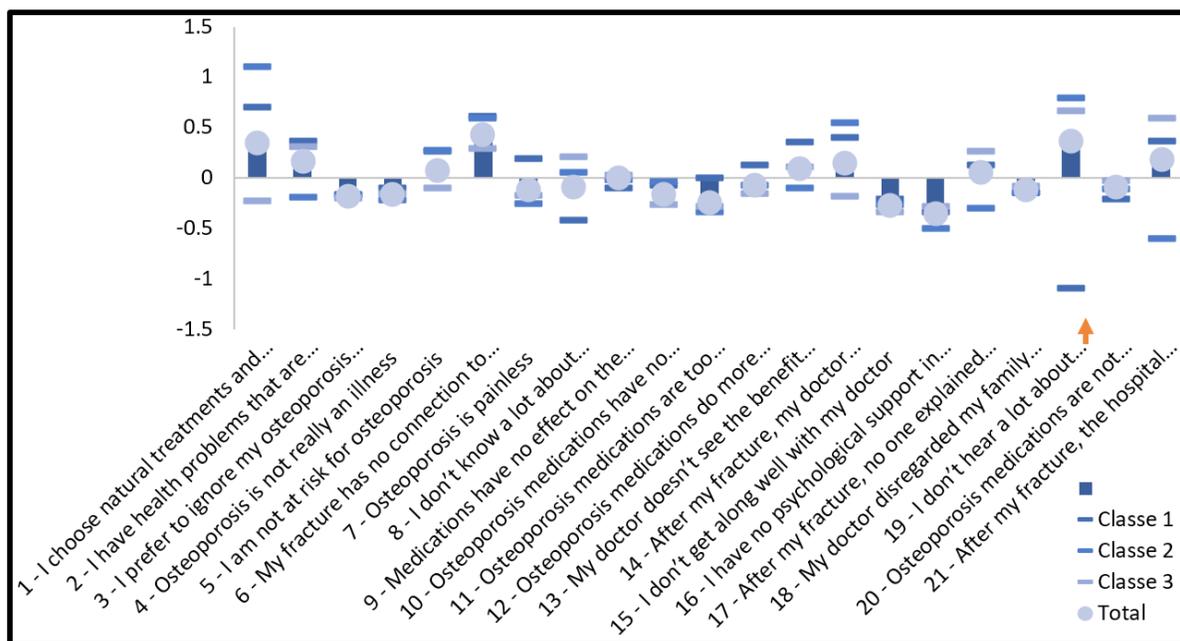


**Figure 1:** Hierarchical rating of expectations for care.

The number of expectations with a mean importance score significantly greater than zero (eleven) is higher than that for barriers. The absolute score is very similar for the first five items (2, 1, 5, 16 and 10), and the coefficients of variation of all eleven significant items overlap. The seven items with scores significantly lower than zero, considered relatively unimportant by panellists, were on the other hand better differentiated.

### Preference heterogeneity

The latent class analysis only included the 311 patients with complete questionnaires. Since the classification of items for the expectations was not particularly discriminating, responder profiles were only evaluated for the barriers to care item set. The variation in the item scores between panellists was best explained by partition into three classes. Significant differences between scores were observed for around half the items (Tukey HSD test; Figure 2).



**Figure 2:** Latent Class Analysis.

This was notably the case for Item 1 (Class 2 > Class 1 > Class 3), Item 19 (Class 2 ≡ Class 3 > Class 1), Item 21 (Class 1 ≡ Class 3 > Class 2).

### Class 1 (the independents)

Class 1 constitutes 18.3% of the panellists and is represented by individuals who probably understand osteoporosis well. They do not consider lack of awareness about osteoporosis to be an important barrier to the implementation of prevention. For example, they rank Item 19 (*You do not hear enough about osteoporosis and its treatment*), which ranks second in the overall population, in last place (Figure 2). In second last place, they rank Item 8 (*I do not know much about osteoporosis treatments or their efficacy*). However, they consider the gaps in healthcare provision as important barriers (Items 13, 17 and 21 are all ranked in the top ten). On the other hand, they are happy to manage their osteoporosis outside the health system, with Item 1 (*I prefer to take natural treatments and pay attention to what I eat*) ranked as most important.

### Class 2 (the unaware)

Class 2 accounts for 31.1% of the panellists and corresponds to individuals who are not particularly concerned about the risk of osteoporosis. Item 5 (*I am not exposed to a risk of osteoporosis*) is ranked fifth in this group (Figure 2). They do not seem to be aware of the system's failures as they rank Item 21 (*After my fracture, the hospital did contact my GP for follow-up; ranked fourth overall*) in last place and Item 17 (*No-one has explained to me about osteoporosis*) in 18th place (ninth overall). On the other hand, as in the overall group, Item 19 (*You do not hear enough about osteoporosis and its treatment*) is ranked second.

### Class 3 (the victims of the system)

Class 3 accounts for 50.5% of the panellists and corresponds to individuals who are eager for medical management of osteoporosis and mostly encounter barriers related to lack of communication and coordination in care (Figure 2). Item 19 (*You do not hear enough about osteoporosis and its treatment*) was ranked in first place. Item 21 (*After my fracture, the hospital did contact my GP for follow-up*) was ranked second and Item 2 (*I have more important health problems than my osteoporosis*) third. On the other hand, they did not attach importance to barriers related to medication (Items 10, 11 and 12) and Item 1 (*I prefer to take natural treatments and pay attention to what I eat*), which ranked in third place overall, was ranked 17th in this group.

## Discussion

The objective of this study was to identify barriers and expectations related to the management of osteoporosis and to rank these in order of importance for people who experienced osteoporotic fractures. For barriers, it was possible to rank the items adequately, the three most important being the belief that fractures are unrelated to osteoporosis, insufficient information on osteoporosis and its treatments and a preference for alternative medicine approaches. In terms of response patterns, three distinct profiles could be identified. However, for expectations, the items could not be sufficiently differentiated to generate a useful hierarchy.

In general, the findings of the survey paint a distressing picture of the state of osteoporosis management in France. People with fragility fractures frequently do not believe that their fracture is due to osteoporosis, are not aware that the occurrence of a fracture is a risk factor for re-fracture, are not very concerned by this health issue and do not believe that effective treatments exist to fight osteoporosis. Their physician has never talked to them about osteoporosis and they have not discussed the need for tests or treatment.

We identified three profiles of individuals with fractures who had quite different perceptions of the barriers to better fracture management. For example, Item 1 (*I prefer to take natural treatments and pay attention to what I eat*) ranked as most important by Class 1 but only 17th out of 21 in Class 3. On the other hand, Item 19 (*You do not hear enough about osteoporosis and its treatment*), was ranked in last place in Class 1 but first in Class 3. These important differences in perceptions needed to be taken into account when defining public health strategies for improving the quality of osteoporosis care.

## Comparison with previous studies

Much qualitative research has been conducted to explain the gap between best clinical practice and what actually occurs in everyday care [20,25,26,31-42]. These studies have provided valuable information and identified numerous possible barriers to better care. However, these findings are often inconsistent, and this is probably in part attributable to the lack of quantitative hierarchical information on their relative importance and in part, as demonstrated in this study, that different barriers are more or less important for different groups of patients.

Our study confirms that two groups of factors seem to contribute to the care gap from the patient's perspective. The first is a lack of understanding by patients of the nature of osteoporosis. A relationship between osteoporosis and fracture is rarely considered (Item 6) and the fracture is perceived to be 'an accident'. Osteoporosis is frequently not perceived as an illness because

it is imperceptible and lacks clinical manifestations commonly associated with a disease by patients [32,40]. If a fracture does not occur, the lack of symptoms and the limited impact on activities of daily living lead patients to think that they are not ill. In addition, as bone is internal and cannot be felt, it is not thought of in terms of health or disease. Referring to osteoporotic fractures as fragility fractures reinforces these beliefs, as patients believe that their fractures are attributable exclusively to an external trauma [20]. Similarly, patients do not see the occurrence of a fracture as a sentinel event signalling a high risk of re-fracture [42], and such misconceptions may sometimes be encouraged by physicians [25]. Finally, participants do not consider it necessary to be treated for osteoporosis, consider that they have not received useful and accurate information about treatment, and often believe available treatments to be ineffective, dangerous or difficult to take. This may account for the fact that many patients believe that alternative medicine and healthy lifestyle interventions are the best way to avoid a fracture.

The second group of factors relates to shortcomings in patient care. Different physicians are responsible for the diagnosis of osteoporosis (the general practitioner, the rheumatologist) and for the management of fractures (the orthopaedic surgeon). This means that these physicians need to communicate with each other to ensure satisfactory follow-up after a fracture and to implement re-fracture prevention measures [43], but in everyday practice, they do not communicate in this way. Patients also consider that it is difficult to get answers to their questions on fracture management from health professionals, who are, too often, unable to explain properly the utility of bone densitometry or treatment. A real dialogue between the physician and the patient on the nature of osteoporosis, and its causes and consequences, may be the best predictor of a patient accepting anti-osteoporotic treatment. The current management paradigm does not provide the best environment for such a dialogue to take place. Finally, osteoporosis generally affects an elderly population with other comorbidities. For this reason, osteoporosis treatments may be considered by general practitioners to be of secondary importance compared to treatment of diseases with more visible and serious consequences such as cancer or cardiovascular disease [41].

## Implications for policy makers: answers with regards to perceived barriers

The barriers identified in this study provide valuable information from the perspective of people with fragility fractures for healthcare decision-makers, which could be used to set priorities for improving patient education and developing a comprehensive approach to care.

Patient education in the field of osteoporosis would be the most important objective to pursue. The main challenge for effective secondary prevention of osteoporosis is to re-establish the link between osteoporosis and the fracture by explicitly giving the name ‘osteoporotic fracture’ rather than ‘fragility fracture’. The message to the public should be that the osteoporotic fracture is not an accident. Another important education goal is to build awareness that effective treatments exist to prevent further fractures. Apart from the direct benefit of increasing patient awareness and knowledge of osteoporosis, this would also have the indirect benefit of facilitating dialogue with the physician, ensuring that the patient asks the right questions, receives satisfactory answers and takes an active part in therapeutic decision-making.

Secondly, training of healthcare professionals about osteoporosis care is fundamental for implementing an effective prevention policy for osteoporotic fracture. Improving physician education is as important as patient education, since failure to talk about osteoporosis, failure to recommend bone densitometry and failure to propose treatments other than lifestyle measures are frequently reported as important barriers by people with fragility fractures. The principal target of such education should be the healthcare professional on the front-line for following up patients after an osteoporotic fracture (in most cases the general practitioner), who should be conscious of the importance of sending the patient for bone densitometry, evaluating fracture risk and proposing treatments. Guidelines are available worldwide for helping the physician do this appropriately.

Finally, a crucial lever for improvement relates to coordination of care between the different healthcare professionals involved. In particular, it is important that patients hospitalised for treatment of a fracture be directed to a physician following discharge for detailed evaluation and implementation of an appropriate management plan. This coordination is currently imperfect and could be improved by being more structured. In this respect, fracture liaison services may be beneficial in ensuring continuity of care following an osteoporotic fracture [16].

The identification of different profiles of patients using latent class analysis emphasises the importance of a personalised and operational approach to osteoporosis care. For this reason, during the immediate follow-up after a fracture, it is necessary for the physician to discuss perceptions and awareness of osteoporosis with the patient. In the latent class analysis, individuals in Class 2, which accounted for around one-third of all participants, did not seem to be particularly aware or concerned by the implications of having osteoporosis, and such individuals should be a priority for patient education initiatives. Likewise, individuals in Class 1 (around 10% of panellists) consider that they can manage

themselves with alternative medicine approaches and a healthy lifestyle. While the choice of alternative medicine is a perfectly respectable one, it should be incumbent on the physicians to ensure that this is an informed choice and not made because the patient is unaware of the benefits and risks associated with available medications.

### **Strengths and Limitations of the Study**

The principal strength of the study was to add a quantitative evaluation to the qualitative approach, which has provided information on which barriers to care are the most important. Ranking the barriers was performed using the BWS method, which is more powerful and discriminating than alternative methods such as Likert scales or visual analogue scales, since it obliges respondents to make an explicit choice rather than allowing them to attribute “middle-of-the-road” scores to all items. Another strength is that the study participants were drawn from a general population panel and not recruited by physicians, which avoids possible inclusion bias due to assessing barriers to care uniquely in individuals who were already being managed for their osteoporosis. Among the limitations, it is possible that the identification of barriers evaluated was not exhaustive and important items may have been neglected. Secondly, the items were worded in general terms, which may have confused some participants and led to different interpretations and thus different responses from one respondent to another. Further studies using discrete choice experiments to evaluate the relative importance of a restricted set of the most discriminating items would be useful for improving understanding of the hierarchy of importance of these items. Finally, given the size of the study population (324 individuals) and the large number of items to be tested (21 barriers and 21 expectations), each pair of attributes was presented on average only once. This limited the precision of the mean importance scores obtained, and may explain why we were not able to generate a sufficiently discriminating hierarchy for the expectations.

### **Conclusions**

Quality of care for people with fragility fractures is clearly sub-optimal and best practices of care are rarely offered. Identifying and lowering the barriers should be an important objective for public health policy. This study has determined the relative importance of a series of barriers to better care cited by people with fragility fractures. From the perspective of these individuals, two groups of factors seem to contribute to the care gap in osteoporosis, namely a lack of understanding of the nature of osteoporosis and shortcomings in the organisation of care provision. However, perceptions vary between different individuals and this heterogeneity needs to be taken into consideration when making decisions.

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