Summary

Background: In Spain, the flow of medical care for a patient with a fracture due to postmenopausal osteoporosis (PO) in the hospital system is not understood. A literature review has been carried out in order to define the hospital care pathway for patients with fracture due to PO in normal clinical practice, taking into account the different medical specialisms involved. In addition, it was attempted to determine the role of each specialist and the most common referral services.

Material and methods: The databases PubMed/Medline, ISI Web of Knowledge, EMBASE and Google Scholar, IBECS (Spanish Bibliographical Index in Health Sciences (Índice Bibliográfico Español en Ciencias de la Salud)) and MEDES (Medicine in Spanish (Medicina en Español)) were consulted, as well as the web pages of the Spanish Society of Rheumatology, the Spanish Society for Bone and Mineral Metabolism Research, the Spanish Society of Orthopaedic Surgery and Traumatology, and the Spanish Association for the Study of the Menopause, to identify publications appearing between 2000 and 2010 in English or Spanish. The principal national clinical practice guides (CPG) for PO were reviewed.

Results: A total of 114 articles were identified. After discounting non-relevant publications, duplicate publications and those published in languages other than English or Spanish, 13 articles were selected. 4 articles were excluded (n=2 screening for osteoporosis, n=1 risk factors, n=1 cost studies), with a total of 9 articles being reviewed. All the articles were international (n=9), including American (n=4), Canadian (n=2), Swiss (n=1), Irish (n=1) and multinational (n=1), and described the outpatient management of fractures due to PO mainly in the extra-hospital environment. Notable in this environment is the essential role of the orthopaedic surgeon and the need for their coordination with family doctors to guarantee the optimum follow up of patients and the prevention of second fractures. The CPGs reviewed referred only to the diagnosis and therapeutic management of the patient with PO. No information was found on referral services, or on the role of each specialist in the management of these patients.

Conclusions: The care pathway for patients with osteoporotic fracture, and which professionals are involved, are poorly described in the literature, both nationally and internationally. The clinical management of patients with fracture due to osteoporosis in hospitals is an area of healthcare which needs description and analysis.

Key words: postmenopausal osteoporosis, osteoporotic fracture, management of the disease, bibliographical review.
Introduction
Osteoporosis is a disease characterised by a reduction in bone mass and changes in the microarchitecture of bone tissue which result in an increase in fragility, and consequently, a high risk of fractures. These may occur in any part of the skeleton, although the areas most affected are the spinal column, the distal radius (Colles fracture) and the hip. It has been estimated that a woman of 50 years of age has a 40% risk of suffering a fracture during the rest of her life, while in men this risk is 13%.

Osteoporosis is the most prevalent disease of bone, affecting 35% of Spanish women over 50 years of age, a percentage which rises to 52% in those over 70 years of age. One in every 5 women aged over 50 has at least one vertebral fracture due to osteoporosis, which is associated with a deterioration of health-related quality of life and an increased risk of suffering other fractures. The annual incidence of femoral fracture in women over the age of 50 years is 3 per 1,000, while the incidence of fracture of the distal forearm is nearly twice that. In Spain there are 90,000 hip fractures and 500,000 vertebral fractures per year linked to osteoporosis, according to the Spanish Rheumatology Society (SER) in its III Document on Osteoporosis. The incidence of hip fracture in Spain varies between 34.9 and 83 fractures per 1,000 inhabitants.

According to a survey, aimed essentially at outpatients, on the management of resources in osteoporosis, we found that professionals involved in its treatment included, amongst others, rheumatologists, endocrinologists and traumatologists. Especially notable was the role of the endocrinologist and traumatologist in its diagnosis, with special emphasis on the role of the latter after the appearance of the first fractures. The gynaecologist and the doctor of internal medicine, on their part, play an essential role in the diagnosis of postmenopausal osteoporosis (OP). What is not known, however, is the role of these, and other specialists, in the management of the patient with fracture due to postmenopausal OP in the hospital setting, and how each of them is linked in the medical care pathway for this group of patients in Spain.

Objectives
Principal
To carry out a systematic literature review on the care pathway followed by patients with fracture due to OP in normal clinical practice in a hospital setting, especially taking into account the different medical specialisms involved.

Secondary
To determine how each specialism influences the hospital care pathway followed by these patients, and to describe which are the most common referral services in and from the hospital.

Methodology
Selection criteria
The criteria for including articles were those:

- Referring to patients with OP and fracture.
- Related to the clinical management of this pathology.
- Which were National and international.
- Carried out in a single centre or multiple centres.
- Published between January 2000 and May 2010.
- In English or Spanish.
- Which were national clinical guides.
- Which were systematic literature reviews.

Excluded were:
- Clinical trials, due to the experimental context in which they are developed.
- Articles referring to the prevention and diagnosis of OP.

Search strategy
To identify the most relevant studies to be included in the bibliographical review, a search was made of the following: Pubmed/Medline database (including the Medlex and Ibeqs databases). ISI Web of knowledge (including the Web of Science, Current Contents Connect, ISI Proceedings, Derwent Innovations Index, Journal Citations Report, Essential Science Indicators), Embase and the grey literature in Google Scholar, as well the bibliographical reference lists in the articles selected.

In Pubmed various combinations of Mesh terms were used:
- Search 3: “postmenopausal osteoporosis management” AND “fracture” (616 articles).

The following terms were used in the search with the ISI Web of Knowledge:
The terms used for the **EMBASE** search were:
- Search 1: “after or follow” AND “fragility or osteoporosis” AND “fractures” (89 articles).
- Search 2: “practice and pattern” OR “practice and management” AND “fragility or osteoporosis” AND “fractures” (20 articles).
- Search 1 OR Search 2 (107 articles).
- Duplicates (63 articles).
- Year limited to, “2000-2010” (60 articles).
- Limited to “English or Spanish” (46 articles).

The search strategy for the **IME** database (Índice Médico Español):
- Search 1: “osteoporosis” AND “hospital” (2 articles).
- Search 2: “osteoporosis” AND “manejo” (4 articles).
- Search 3: “osteoporosis” AND “servicio” (3 articles).
- Search 4: “osteoporosis” AND “derivación” (1 article).

In addition, in the Google Scholar database a search was carried out using the terms “practice patterns in postmenopausal osteoporosis and fracture” “postmenopausal osteoporosis fracture intervention”. The following local databases were also explored: IBECs (Índice Bibliográfico Español en Ciencias de la Salud) and MEDES (Medicina en Español) applying similar search terms in Spanish.

The web pages of the following scientific societies were also reviewed: the Spanish Society of Rheumatology (SER), the Spanish Society for Bone and Mineral Metabolism Research (SEIOMM), the Spanish Society for Orthopaedic Surgery and Traumatology (SECOT), the Spanish Society of Gynaecology and Obstetrics (SEGO), and specifically, the Spanish Association for the Study of the Menopause (AEEM).

### Results
The search showed up a total of 114 articles as candidates for review. After discarding non-relevant publications, duplicated articles and those published in a language other than English or Spanish, 13 articles were selected. 4 articles were excluded for various reasons (n=2: osteoporosis screening, n=1 risk factors for osteoporosis, n=1: costs study) (Figure 1).

![Figure 1. Results of literature search](image-url)

In the sources consulted no articles were identified which referred specifically to the medical care pathway for patients with osteoporosis. In the sources consulted no articles were identified which referred specifically to the medical care pathway for patients with osteoporosis. In the sources consulted no articles were identified which referred specifically to the medical care pathway for patients with osteoporosis.
pathway in hospital of the patient with fracture due to OP. Below, we describe the principal data obtained from each of the articles reviewed, broken down by country:

**Articles selected**

1. **International multicentred**
   A multinational survey was carried out of 3,422 orthopaedic surgeons in France, Germany, Italy, Spain, United Kingdom and New Zealand with the objective of exploring the degree of involvement of orthopaedic surgeons in the identification, evaluation and treatment of patients with osteoporosis. The majority of those surveyed in all countries considered that the orthopaedic surgeon is the professional who should identify and carry out the management of osteoporosis in patients with fracture. In addition, if a fracture due to osteoporosis was suspected, the majority of the surgeons in France, United Kingdom and New Zealand would refer the patient to a specialist in osteoporosis or to the family doctor, while more than 80% of the participants in Germany and Italy reported that they themselves followed up the patient. It was observed that half the surgeons surveyed received little or no information on the treatment of patients with osteoporosis.

2. **United States**
   Skedros et al. carried out a survey on 107 orthopaedic surgeons in relation to the management of patients with osteoporosis. The survey was carried out with the objective of evaluating the opinions and principles of the orthopaedic surgeons in relation to the treatment of patients with osteoporosis, and patients with osteoporosis and fracture. The results showed that the surgeons preferred to refer those patients treated for osteoporotic fractures to primary care doctors to carry out monitoring of the medication used by the patient, and emphasised the importance of ensuring treatment over time to prevent secondary fractures.

   Another study which was developed with the objective of determining if orthopaedic surgeons referred patients with fracture to the primary care (PC) doctor for monitoring effectively described the role of the orthopaedic surgeon in the diagnosis and treatment of osteoporotic fracture. A programme of intervention was suggested to facilitate coordination between orthopaedic surgeons and doctors in PC for the preventative treatment of secondary osteoporotic fractures. The programme proposed carrying out the following actions: 1) a programmed visit to the PC doctor (after less than 4 weeks have elapsed); 2) the initiation of the monitoring of the patient’s bone metabolic state; 3) to propose a date for the performance of densitometry, and 4) education in the prevention and treatment of osteoporosis and osteoporotic fractures. The authors highlighted the fact that in other hospitals in the United States, for example, protocols were used in which patients with hip fracture with strong suspicion of OP have a visit to the doctor of internal medicine or endocrinologist, or the family doctor and/or have a personal visit from a nurse specialising in orthopaedic surgery to monitor the patient and supervise the medication used.

   Feldstein et al. made a study in which interviews and focus groups were carried out to evaluate the management of osteoporosis after a fracture by the specialists involved. It concluded that, in spite of the orthopaedic surgeons recognising that they should play a more active role in the monitoring of this type of patient, the reality is that they are limited to the active treatment of the fracture, without considering the monitoring of the osteoporotic patient. Both the family doctors and the specialists agreed on the necessity of imposing standard protocols which would involve the different professionals (orthopaedic surgeons, radiologists, casualty staff) in the management of osteoporosis at the time of fracture. In addition, the specialists ought to be provided with basic training in relation to osteoporosis and the carrying out of its diagnosis and treatment, while the family doctor would be responsible for the monitoring and prevention of second fractures.

   In relation to the professionals involved in the management of women with OP and forearm fractures, a retrospective study found that during the first 6 months the majority of patients were seen by a doctor as well as by an orthopaedic surgeon: 69% by a doctor of internal medicine or family doctor, 4% by another specialist (gynaecologist or endocrinologist), 2% by both specialists, while 25% only had visited an orthopaedic surgeon 12 months after the fracture. 12% of the participants were recommended to start preventative drug treatment, while 5% were already receiving specific treatment for osteoporosis at the time of the fracture.

3. **Canada**
   Elliot-Gibson et al. carried out a systematic review in which articles were selected which described the activity pathways in the diagnosis and treatment of OP after a pathological fracture. One of the aspects explored was the barriers which exist to the investigation and treatment of OP. Primary care doctors in Canada and Ireland described the principal barriers to the initiation of preventative treatment as the difficulty in carrying out densitometry during the follow up and the lack of time to refer patients for secondary prevention. In this work it is suggested that that the development of an algorithm based on clinical guides is an important step in ensuring the correct management of patients with pathological fracture.

4. **Switzerland**
   Chevalley et al. developed the Osteoporosis Clinical Pathway, with the aim of controlling health costs related to the disease, without altering the quality of the medical care. Any hospitalised patient or out-patient with a recent low energy fracture was considered as a candidate to enter the pathway. The pathway includes three differentia-
Table 1. Articles selected in the bibliographic review

<table>
<thead>
<tr>
<th>Author, Year publication</th>
<th>Country</th>
<th>Objectives</th>
<th>Principal results of interest for the search</th>
</tr>
</thead>
<tbody>
<tr>
<td>McKercher HG, 2000</td>
<td>Canada</td>
<td>Survey carried out in doctors in Ontario in relation to their role in the diagnosis and treatment of osteoporosis</td>
<td>The main barriers to the initiation of treatment were the cost of the therapy, the rejection by the patient of the initiation of the treatment and the time and cost of diagnosis</td>
</tr>
<tr>
<td>Sheehan J, 2000</td>
<td>Ireland</td>
<td>To evaluate the variation in clinical practice of orthopaedic surgeons in relation to the preventative treatment related to fracture of the femur</td>
<td>It was concluded that it is necessary to have a clear definition of the roles, and that local protocols needed to be developed</td>
</tr>
<tr>
<td>Chevalley T, et al. 2002</td>
<td>Switzerland</td>
<td>To design a clinical pathway for osteoporosis for the therapeutic management of patients with low energy impact fracture</td>
<td>A clinical pathway may help in the identification of patients with osteoporosis in a high risk population, providing support both to orthopaedic surgeons and family doctors in the diagnosis and treatment of the disease</td>
</tr>
<tr>
<td>Cuddihy MT, 2002</td>
<td>U.S.</td>
<td>To identify the determining factors in the treatment of OP after a distal forearm fracture</td>
<td>12 weeks after the fracture 83% had visited a doctor (excluding the orthopaedic surgeon). 17% received treatment with drugs for osteoporosis</td>
</tr>
<tr>
<td>Elliot-Gibson V, 2004</td>
<td>Canada</td>
<td>Systematic review of clinical practice in the investigation and diagnosis of OP in women and men with fracture due to fragility</td>
<td>The main barriers encountered were: the cost of the therapy, time and cost of the resource used for the diagnosis, doubts related to the medication, and ambiguity regarding the person responsible for taking on the management of this pathology</td>
</tr>
<tr>
<td>Skedros JG, 2004</td>
<td>U.S.</td>
<td>To determine if orthopaedic surgeons effectively refer patients with osteoporotic fracture to primary care for monitoring of treatment</td>
<td>A total of 43.5% of the patients did not visit a family doctor until 84 days had lapsed since the fracture. The use of antiresorptive medication was only initiated in 53.8% of patients</td>
</tr>
<tr>
<td>Dreinhöfer KE, 2005</td>
<td>France, Germany, Italy, Spain, United Kingdom, New Zealand</td>
<td>Survey regarding the management of osteoporotic fracture</td>
<td>Less than a fifth of those specialists surveyed had referred a patient being treated for fracture for the performance of densitometry, while 20% disclosed that they had never done so</td>
</tr>
<tr>
<td>Skedros JG, 2006</td>
<td>U.S.</td>
<td>Survey of 171 orthopaedic surgeons</td>
<td>68% of those surveyed considered it appropriate to take the role of prescribing treatment for osteoporosis, 74% preferred to administer bisphosphonates, and more than 77% preferred to administer calcium and vitamin D supplements</td>
</tr>
<tr>
<td>Feldstein AC, 2008</td>
<td>U.S.</td>
<td>To evaluate the different perspectives in the management of osteoporosis after fracture</td>
<td>Both family doctors and specialists agreed on the necessity of imposing standardised protocols which would involve the different professionals (orthopaedic surgeons, radiologists, and casualty staff) in the management of osteoporosis at the time of fracture</td>
</tr>
</tbody>
</table>
The nurse gathers the patient data, mainly related to risk factors, such as previous fracture, the level of the patients understanding of their disease, the relationship between the fracture and the disease, calcium and protein intake. In the second step the doctor supervising the programme may carry out densitometry and/or biochemical tests to discount secondary osteoporosis, or refer to a specialist in bone metabolic diseases those patients with a complex medical history and/or other diseases. It is important to mention that throughout the pathway there is constant communication between the orthopaedic surgeon and/or family doctor and the doctor and/or nurse supervising the programme. The last step of the pathway consists of the therapeutic recommendations which the orthopaedic surgeon transmits to the family doctor responsible for monitoring the patient. In conclusion, this algorithm would facilitate the pathway being followed by the orthopaedic surgeon and/or the primary care doctor in the management of patients with osteoporosis while, as the article’s authors explain, the cost-effectiveness of the algorithm needs to be demonstrated in further studies.

### National guides to clinical practice: do these reflect the intra-hospital care pathway after an osteoporotic fracture?

With the aim of reflecting the theoretical recommendations for the management of this type of patient we have reviewed the national clinical practice guides for patients with OP.

Only the “Practical guide to primary care activity: osteoporosis in the Community of Valencia” describes the referral criteria for a patient suspected of having an osteoporotic fracture, which if acute would refer the patient to traumatology, while if the fracture is not acute, the treatment would be referred to the primary care doctors. Subsequently the patient would end up being referred to rehabilitation in both cases. The hospital pathways used in the care of patients with postmenopausal osteoporotic fractures are not described, nor are the medical specialisations involved (Figure 2).

The Working Group of the Spanish Society for Bone and Mineral Metabolism Research (SEIOMM) described in the clinical practice guide they published concerning OP an activity algorithm in patients with vertebral and non-vertebral fracture. Although it makes reference to the recommended clinical management of these patients the guide to clinical practice makes no recommendations as to what should be deployed in the intra-hospital pathway for the management of patients with postmenopausal osteoporotic fractures.

The Spanish Society of Internal Medicine has published an activity protocol for osteoporosis. However, the Guide to Clinical Practice for osteoporosis published by the Spanish Society for Orthopaedic Surgery and Traumatology highlighted the role of the orthopaedic surgeon in the diagnosis and treatment of patients with fracture due to osteoporosis. It does not describe the care pathway which should be followed in this type of patient.

Finally, the Spanish Society for Gynaecology and Obstetrics in their guide published on the menopause and postmenopause mainly focus on the risk factors for fracture in postmenopausal women and the principal treatments indicated in this type of patient. The hospital management of patients with postmenopausal osteoporotic fracture is not specified in this guide. Recently, the AEEM published the “Guide to Clinical Practice for Osteoporosis in Gynaecology”, which mainly addresses the role of the gynaecologist in both the prevention and management of osteoporosis. This guide, also, does not reflect the intra-hospital pathway which is followed in real-world practice with this type of patient.

The guides described, although they refer to the management, diagnosis and therapy for the patient with OP, do not make recommendations regarding the care process or the medical professions which should be involved in the management of patients with fracture due to OP.

### Discussion

The literature published regarding the medical care pathway and the professions involved in the management of patients with osteoporotic fracture is limited. With respect to the extra-hospital environment, what stood out in the articles reviewed was the essential role of the orthopaedic surgeon, inferring the necessity of coordinating their activity with that of the family doctor to guarantee the most appropriate follow up of those patients and the prevention of second fractures. However, in the sources consulted, there were no publications which described, for example, the care pathway followed by a patient with a fracture due to OP in the hospital setting in our country.

There is also little literature which describes the key actions in the management of the disease, such as the lapsed time from the diagnosis to the referral of the patient with OP and fracture. We have identified as one of the common challenges in the management of multifactorial chronic pathologies, such as OP, the multidisciplinary character of its care, with a number of specialists involved. The articles selected reflect the fact that the majority of patients visit other doctors in addition to the orthopaedic surgeon after an osteoporotic fracture, including a doctor of internal medicine or a family doctor, as well as other specialist such as gynaecologists or endocrinologists, but without there being clear referral criteria. The review also showed that the follow up is, in many cases performed by the specialists in traumatology or gynaecology, and in a small percentage (12%) by the family doctor. In spite of the fact that the professional who initially treats the patient is the orthopaedic surgeon, the lack of standardisation in the roles of each of the professions involved in a treatment, meant greater delay for this type of patient.
As we have seen, there are various management patterns with this pathology which differ as a function of the country under consideration. For example, Dreinhöfer et al.7 found that in 5 different countries, the majority of orthopaedic surgeons were focussed on the surgical treatment of fractures, while in other countries such as, for example, Germany, most of the orthopaedic surgeons, in also having a working role outside the hospital setting treating patients with diverse musculo-skeletal pathologies, cover the more clinical aspects of the follow up of the patient with fracture due to postmenopausal osteoporosis.

The articles referring to surveys carried out with orthopaedic surgeons show that these professionals are key in the achievement of an increase in the rate of identification and treatment of osteoporotic fractures. However, studies reviewed by Elliot-Gibson et al.12 indicate that some orthopaedic surgeons consider that the clinical management of this type of patient is the responsibility of other specialists. Various orthopaedic organisations participate actively in increasing the identification of postmenopausal osteoporosis and in improving the treatment of this type of patient.

In Spain there is no literature which describes the medical care pathway for patients with postmenopausal osteoporotic fracture. In spite of including Spanish databases, the articles did not include algorithms for clinical action protocols which should be followed with a patient with an osteoporotic fracture. With the information currently available it is not practicable to describe the influence of each specialism involved in the care of these patients, or the most common referral services. Carrying out of studies which explore these aspects would enable a more homogeneous and standard management of this pathology. Information which it would be useful to discover would be the lapsed time from when the patient suffered the fracture up until the initiation of treatment and monitoring, due to the importance this matter has in the patient's perception of the quality of care they receive.

The national clinical practice guides reviewed do not make explicit the activity algorithm to be

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**Figure 2. Referral criteria in a patient with suspected fragility fracture (Primary Care)**

- **Suspicion of brittle fracture**
  - Discard secondaries
  - Clinical laboratory v resonance (if necessary)
  - Osteoporotic fracture
    - Fracture not acute
      - Treatment
      - Primary Care
      - Acute fracture
      - Refer to orthopedic surgery
      - Patient’s functional restriction
      - Referral to rehabilitation
  - Not osteoporotic fracture
    - No diagnosis
      - Derive internal medicine
    - With diagnosis
      - To derive appropriate specialty

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followed with a patient with osteoporotic fracture in a hospital setting, making mention almost exclusively of the pharmaceutical guidelines to be used. The development of guides which describe the care pathway for this type of patient in the hospital setting, the referral criteria, and the roles of each of the professionals involved, would enable a better management of the pathology and its complications.

Two fundamental limitations should be taken into account when the conclusions of this study are interpreted: firstly, the study does not review the internally disseminated clinical process protocols or clinical process algorithms in hospitals in the Spanish health system, and which very probably exist in many of them. Secondly, only articles in Spanish or English are included, omitting publications in any other language, although Spanish databases have been consulted which essentially prioritise the appearance of national articles.

We consider that this study provides information on the current state of play in this matter and defines an area of healthcare in the Spanish hospital sector in need of study and dissemination, i.e. the management of patients with OP-related fracture and the professional disciplines involved in it.

Conclusions

According to the sources consulted, there is little (or no) descriptive information on the care pathway followed by a patient with osteoporotic fracture, or regarding the professionals involved, at either a national or international level. It is opportune, in the absence of a review of internally disseminated hospital guides, to highlight the need to carry out observational studies which reflect the care pathway followed by this type of patient in the hospital setting.

Acknowledgements: The study was sponsored by Amgen S.A. The authors would like to thank Luis Lizán and Julia Villar of Outcomes 10 and Clara Conill of Amgen for their editorial assistance in the preparation of this publication.

Conflict of interest: The study was sponsored by Amgen S.A. Dr Núria Márín works for Amgen S.A. Dr Luis Lizán works for Outcomes 10 and Drs Blanch and del Pino are specialists who carry out most of their work in the Spanish public health system.

Bibliography