






Excessive osteoporosis screening in women under 65 years: a cross-sectional study

Excesivo rastreo de osteoporosis en mujeres menores de 65 años: estudio de corte transversal

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ABSTRACT Overuse of osteoporosis screening in women at low risk of fracture may lead to overdiagnosis, inappropriate treatment and medicalization. The objective of this work was to estimate the proportion of women aged 45 to 64 enrolled in a private health insurance plan in Buenos Aires undergoing hip dual-energy x-ray absorptiometry (DXA) in 2011 without meeting osteoporosis screening criteria. In this cross-sectional study, 4310 women of this age range that had undergone a hip DXA were identified. A randomly selected subgroup of 401 women was then assessed for the presence of risk factors for osteoporosis and complete data were retrieved for 178 women. Appropriate screening was defined by two criteria: 1) having a 10-year fracture risk higher than that of a 65-year old woman (estimated using the FRAX[®] tool); 2) having at least one risk factor for fracture. It was found that 86.5% of the women who underwent hip DXA did not exceed the minimum 10-year fracture risk threshold required for screening; 5.8% of them had osteoporosis and 61.0% osteopenia. According to the second criterion, 49.4% had no risk factors, 3.4% of these women had osteoporosis and 62.5% osteopenia. The results show that at least half the women screened did not meet osteoporosis screening criteria.

KEY WORDS Osteoporosis; Mass Screening; Health Services Misuse; Argentina.

RESUMEN El rastreo de osteoporosis en mujeres con bajo riesgo de fractura (sobresu) puede conducir a sobrediagnóstico, tratamiento inapropiado y medicalización. El objetivo de este trabajo fue determinar la proporción de mujeres de 45 a 64 años afiliadas a un plan de medicina prepaga de Buenos Aires, Argentina, que realizaron al menos una densitometría ósea de cadera durante 2011 y no cumplían criterios para el rastreo. Se realizó un estudio observacional de corte transversal. Se identificaron 4.310 mujeres de este rango etario que se realizaron una densitometría ósea, entre las que se seleccionó una muestra aleatorizada de 401 mujeres y se obtuvieron datos completos para 178 mujeres. Para determinar si el rastreo era apropiado se utilizaron dos criterios: 1) tener un riesgo de fractura a 10 años mayor que una mujer de 65 años (regla FRAX[®]); 2) presentar al menos un factor de riesgo de fractura. Un 86,5% de las densitometrías óseas fueron realizadas en mujeres cuyo riesgo estimado por FRAX[®] no superaba el umbral mínimo recomendado, constatándose osteoporosis en el 5,8% y osteopenia en el 61,0%. En relación con el segundo criterio, el 49,4% no presentaba siquiera un factor de riesgo, documentándose osteoporosis en el 3,4%, y osteopenia en el 62,5%. Los resultados muestran que al menos la mitad de las mujeres no cumplía con los criterios de rastreo.

PALABRAS CLAVES Osteoporosis; Tamizaje Masivo; Mal Uso de Servicios de Salud; Argentina.

INTRODUCTION

As life expectancy increases, the proportion of the population at risk of fracture tends to grow⁽¹⁾ – this is particularly true for spine, wrist, and hip fractures. Hip fractures are associated with a loss of independence as well as diminished quality of life and life expectancy; 20% of patients require home-based care, only about 40% fully regain their prior levels of independence, and patients are 15% more likely to die within a year⁽²⁾ than the general population of their age group. On average, direct costs of treatment for each patient that sustains a hip fracture are estimated at \$3800 (USD) in Argentina – representing a total of 130 million dollars per year nationwide.⁽³⁾

The World Health Organization (WHO) has defined osteoporotic fragility fractures as fractures caused by mild trauma (equivalent to a fall from standing height or lower) that would be insufficient to fracture a normal bone. On the other hand, in 1994 a panel of experts proposed diagnostic criteria for densitometric osteoporosis based on bone mineral density as determined by dual-energy x-ray absorptiometry (DXA). This allows us to think of densitometric osteoporosis as a *risk factor* for osteoporotic fragility fractures, characterized by low bone mass and microarchitectural deterioration of bone tissue.⁽⁴⁾ In effect, a person is considered to have risk factors for densitometric osteoporosis when their bone mass is at least 2.5 standard deviations below the average found in the healthy 30-year-old population (the age at which bone mass reaches its maximum). This result is recorded as a T-score below or equal to -2.5.⁽⁵⁾

Screening strategies aim to identify asymptomatic women with high probability of sustaining osteoporotic fragility fractures in order to implement fall prevention programs and eventually initiate antiresorptive therapy if their risk profile calls for it. A number of scientific associations, which base their consensus on systematic literature reviews, have agreed that all women should initiate DXA screenings at age 65, and should begin at a

younger age only if they present additional risk factors.^(6,7,8,9)

There are two primary criteria to detect the subpopulation of women under 65 at a higher risk for osteoporotic fragility fracture:

1. Use of the Fracture Risk Assessment Tool (FRAX[®]), a clinical risk assessment instrument that combines information on different variables associated with the probability of sustaining this type of fracture. Using the results of a systematic review and meta-analysis of primary data from nine prospective cohorts, the creators of the FRAX[®] calculator incorporated the following variables: sex, age, body mass index, personal fracture history, parents' history of hip fracture, chronic use of corticosteroids, history of tobacco and alcohol use, and other secondary causes of osteoporosis. The FRAX[®] calculator considers local epidemiological characteristics of different countries, assigns each factor an independent coefficient that reflects its predictive capacity, and works with or without data from DXA scans of the femoral neck. It is used to determine those who exceed the risk threshold and can be applied to persons of both sexes from 40 to 90 years of age. This instrument considers the threshold for screening to be the 10-year fracture risk of a 65-year-old white woman with no additional risk factors (Grade B recommendation),^(7,10) which in Argentina is 6.9%.
2. The presence of at least one of the previously mentioned risk factors.^(13,14)

Notwithstanding, there is consensus that osteoporotic fragility fractures have multiple etiologies. In the causal pathway, the role of falls linked to the following situations (among others) can be highlighted: muscular weakening (attributed to lack of exercise and/or malnutrition); loss of equilibrium and of reflexes linked to certain medications, aging, and diminished joint mobility; vision problems; homes inadequately equipped to meet the needs of an aging person; and social isolation. Given the multifactorial nature of

fractures and their consequences (which are the final outcomes to be avoided), we concur with other authors^(15,16) that measuring bone mineral density and subsequently prescribing medication without considering the patient's overall probability of sustaining osteoporotic fragility fractures and in the absence of a multidisciplinary approach to the links in the causal chain of falls – probably due to the influence of the pharmaceutical industry's marketing strategies – is overrepresented as a course of action in decision-making regarding fracture prevention, especially considering that this risk factor makes up only a small part of the multicausality of this type of event.^(15,17) This situation has led on one hand to densitometric osteoporosis diagnoses and the treatment decisions of patients being primarily based on the results of DXA scans over the last two decades; and on the other hand, to certain demographic groups being “over-screened” with DXA, along with consequent possibilities for over-diagnosis of densitometric osteoporosis, medicalization, unnecessary labeling, and inefficient resource allocation.^(18,19,20)

Based on the similarities between this description and our clinical assessment, we decided to conduct this research with the primary objective of identifying the proportion of women aged 45 to 64 enrolled in a private health insurance plan (in this case, that of the Hospital Italiano de Buenos Aires), who had undergone at least one hip and spine DXA scan during 2011, but who did not meet the criteria for densitometric osteoporosis screening (and was thus considered to be a case of inappropriate screening). Additional objectives of this research were as follows: to describe the distribution of the results of these DXA scans; to determine the proportion of women in this subgroup who had been prescribed antiresorptive therapy despite not meeting the criteria for osteoporosis screening; and to analyze if appropriate requests for DXA scans could be predicted by whether healthcare provision was coordinated by a primary care physician or by a specialist (in endocrinology, rheumatology, and/or gynecology).

MATERIALS AND METHODS

A cross-sectional study was conducted at the Hospital Italiano de Buenos Aires (a private teaching hospital with locations in the Autonomous City of Buenos Aires and in Greater Buenos Aires), which offers private health insurance plans and serves a primarily middle-class population. A list of women enrolled in the private insurance plan who were between 45 and 64 years of age on December 31, 2011 (n = 19,799) and who had undergone at least one DXA scan during the previous year (n = 4,310) was requested from the Medical Information Service [*Servicio de Informática Médica*]. From that list of 4,310 women, a simple randomization was performed in which the identification numbers from the initial list were ordered with the True Random Number Service program. From this random ordering, the first 401 women were selected; of these, complete information could be retrieved for 178 women via medical records and telephone interviews.

In order to categorize the DXA scans we utilized the diagnostic criteria of the WHO, which establishes densitometric osteoporosis as a T-score below or equal to -2.5, osteopenia as a T-score between -2.5 and -1, and normal bone density as a T-score equal to or greater than -1. Screening was considered inappropriate if the following conditions were not met:

1. 10-year fracture risk below 6.9% (the baseline risk of a 65-year-old Argentine woman without risk factors for osteoporotic fragility fractures) according to the FRAX[®] clinical prediction tool.
2. Presence of at least one risk factor for osteoporotic fragility fractures.^(7,10)

The results of DXA scans, the prescription of pharmacological therapies (bisphosphonates, calcium, and Vitamin D), and demographic variables (age, sex, weight, height, and body mass index) were obtained from electronic medical histories. The presence of risk factors for osteoporotic fragility fractures

was determined via telephone interview, in which informed consent was obtained orally from respondents. These risk factors included any of the following: prior history of osteoporotic fracture of the spine, hip, and/or wrist in adulthood; history of hip fracture in first-degree relatives; current tobacco use; chronic glucocorticoid consumption (daily oral intake for at least three consecutive months); rheumatoid arthritis; excessive alcohol use – three or more doses (“drinks”) per day (8 to 10g of alcohol); or secondary causes of osteoporosis such as type 1 diabetes (insulin-dependent), adult osteogenesis imperfecta, hyperthyroidism, hypogonadism, premature menopause (before age 45), malnutrition, chronic malabsorption, or chronic liver disease.

We defined a patient as having healthcare provision coordinated by a primary care physician if at least 50% of total visits were with her primary care physician during the 48 months prior to the DXA screening in question (*usual provider of care index* greater than 0.5).⁽²¹⁾ Additionally, the number of visits to specialists in gynecology, rheumatology, and endocrinology in the same period was recorded.

Statistical analysis was conducted with Stata 8.0 software. Given the findings reported in specialized literature and assuming an inappropriate screening rate of approximately 50%, we estimated that the minimum number of observations (patients) that should be included in the final sample was 164, in order to obtain an estimate of this rate with a confidence interval with a margin of error of $\pm 7.5\%$. Multivariate analysis was conducted using a logistic regression model to evaluate the association between appropriate DXA screenings and having had healthcare provision coordinated by a primary care physician.

Ethical aspects of the research

Confidentiality was guaranteed at all times to study participants; the database with patient information was password-protected and could only be accessed by members of the research team. This study was carried out

in accordance with national and provincial regulations on research with human subjects, in line with National Ministry of Health Resolution 1480/2011, and the recommendations for medical research involving human subjects found in the Declaration of Helsinki of 1964 and its amendments, in addition to the guidelines found in the Good Clinical Practices manual of the Pan American Health Organization.⁽²²⁾

Additionally, the research protocol was approved by the Committee on Protocol Ethics at the Hospital Italiano de Buenos Aires (Code 1884).

RESULTS

Out of the 401 women included in the random sample, we were able to contact 190 via telephone. Of the women contacted, 187 gave their consent to participate in the interview, and of these, 178 had undergone a hip and spine DXA. The average age of the women contacted was 58.5 years, and average body mass index was 25.5 kg/m².

Of the risk factors revealed in the telephone interviews, the most frequent were tobacco use (25.8%) and premature menopause (19.8%), with 13.2% of respondents reporting that their mother or father had suffered from a hip fracture. No clinical or statistically significant differences with respect to age, body mass index, tobacco use, DXA results, or total number of doctor visits with primary care physicians and specialists were noted between the subpopulation that responded to the telephone interview and that which did not (Table 1).

In accordance with our primary objective – the total proportion of DXA scans conducted in women who had a low 10-year risk for osteoporotic fragility fractures – using the first condition for screening proposed, 86.5% [95% CI (80.6; 91.2)] of DXA scans were conducted in women who did not meet conditions for screening according to the FRAX[®] tool (they did not surpass the 10-year risk threshold for osteoporotic fragility

Table 1. Comparison of studied variables between the contacted population with complete information and the population not contacted and/or with incomplete information. Buenos Aires, Argentina, 2011.

| Variables | Contacted with complete data (n = 178) | | Not contacted and/or with incomplete data (n = 223) | | p-value |
|---|---|------|--|------|---------|
| | \bar{x} | DS | \bar{x} | DS | |
| Age (in years) | 58.5 | 4.5 | 58.3 | 4.8 | 0.712 |
| Body mass index | 25.5 | 4.2 | 25.5 | 4.4 | 0.959 |
| Visits to primary care physician | 5.6 | 6.1 | 4.9 | 5.7 | 0.224 |
| Visits to specialists | 3.0 | 3.3 | 3.4 | 3.9 | 0.285 |
| | M_e | IR | M_e | IR | |
| Total visits | 7.5 | 3-11 | 7 | 3-11 | 0.657 |
| | n | % | n | % | |
| Tobacco use | 45 | 25.6 | 50 | 22.4 | 0.464 |
| DXA | | | | | |
| Spine | | | | | |
| Normal | 69 | 38.8 | 86 | 39.5 | 0.898 |
| Osteopenia | 85 | 47.8 | 106 | 48.6 | |
| Osteoporosis | 24 | 13.5 | 26 | 11.9 | |
| Hip | | | | | |
| Normal | 56 | 31.5 | 77 | 36.5 | 0.373 |
| Osteopenia | 111 | 62.4 | 117 | 55.5 | |
| Osteoporosis | 11 | 6.2 | 17 | 8.1 | |
| Health care coordinated by primary care physician | 118 | 66.3 | 145 | 65.0 | 0.790 |

Source: Own elaboration.

\bar{x} = Average; SD = Standard deviation; M_e = Median; IR = Interquartile range; DXA = dual-energy x-ray absorptiometry.

fracture, which in Argentina is 6.9%, and were therefore considered to be low risk).

The total proportion of DXA scans that were conducted in women who did not have even one risk factor for osteoporotic fragility fractures (taking into account the second condition proposed) was 49.4% [CI 95% (41.9; 57.0)] (Table 2).

Of the 154 women that did not meet criteria for screening with DXA according to the FRAX[®] tool, densitometric osteoporosis was diagnosed in 5.8% and densitometric osteopenia in 61.0%. Of the 88 women that did not present risk factors, these diagnoses were made in 3.4% and 62.5% respectively (Table 3).

Prescriptions for bisphosphonates were confirmed in the electronic medical histories of 35.1% of the 154 women that did not meet

FRAX[®] criteria and in 35.2% of the 88 women that did not meet criteria for screening with DXA (Table 4). As could have been expected, women at low risk of fracture according to

Table 2. Proportion of women who underwent DXA scans according to screening criteria. Buenos Aires, Argentina, 2011

| Screening criteria | n | % | 95% CI |
|---|-----|------|------------|
| Did not meet FRAX [®] criteria | 154 | 86.5 | 80.6; 91.2 |
| Did not present risk factors | 88 | 49.4 | 41.9; 57.0 |

Source: Own elaboration.

FRAX[®] = Fracture Risk Assessment Tool; 95% CI = 95% confidence interval; DXA = dual-energy x-ray absorptiometry

Table 3. Distribution of DXA results by screening criteria. Buenos Aires, Argentina, 2011.

| Screening criteria | n | % | 95% CI |
|--|----|------|------------|
| Did not meet FRAX® criteria (n=154) | | | |
| Normal | 51 | 33.1 | 25.7; 41.1 |
| Osteopenia | 94 | 61.0 | 52.9; 68.8 |
| Osteoporosis | 9 | 5.8 | 2.7; 10.1 |
| Did not present risk factors (n=88) | | | |
| Normal | 30 | 34.1 | 24.3; 45.0 |
| Osteopenia | 55 | 62.5 | 51.5; 72.6 |
| Osteoporosis | 3 | 3.4 | 0.71; 9.6 |

Source: Own elaboration.

FRAX® = Fracture Risk Assessment Tool; 95% CI = 95% confidence interval; DXA = dual-energy x-ray absorptiometry.

Table 4. Proportion of women with low risk for osteoporotic fragility fracture according to screening criteria, for whom prescription of pharmacological treatment was documented. Buenos Aires, Argentina, 2011.

| Prescription of pharmacological treatment | n | % | 95% CI |
|--|----|------|------------|
| Did not meet FRAX® criteria (n=154) | | | |
| Bisphosphonates (with or without calcium and/or vitamin D) | 54 | 35.1 | 27.3; 43.2 |
| Calcium and/or vitamin D only | 52 | 33.8 | 26.4; 41.8 |
| Did not present risk factors (n=88) | | | |
| Bisphosphonates (with or without calcium and/or vitamin D) | 31 | 35.2 | 25.3; 46.1 |
| Calcium and/or vitamin D only | 25 | 28.4 | 19.3; 39.0 |

Source: Own elaboration.

FRAX® = Fracture Risk Assessment Tool; 95% CI = 95% confidence interval.

the FRAX® tool tended to be significantly younger than those who surpassed the risk threshold. Through logistical regression analysis no statistically significant association was found between having healthcare coordinated by a primary care physician and the likelihood of DXA scans being conducted in

women who met criteria for screening according to FRAX® [OR 1.34; 95% CI (0.53; 3.43)] or who had at least one risk factor for osteoporotic fragility fractures [OR 0.95; 95% CI (0.51; 1.76)] (Table 5).

Table 5. Distribution by age, body mass index, and healthcare coordination according to whether or not patient met criteria for hip DXA. Buenos Aires, Argentina, 2011.

| Screening criteria | Yes, criteria met | | | No, criteria not met | | | p-value |
|-------------------------------------|-------------------|-----------|------------|----------------------|-----------|------------|---------|
| | % | \bar{x} | CI 95% | % | \bar{x} | CI 95% | |
| Risk according to FRAX® tool | | | | | | | |
| Yes (n=24); no (n=154) | | | | | | | |
| Age (in years) | - | 61.8 | 60.4; 63.3 | - | 58.1 | 57.3; 58.8 | 0.0001 |
| BMI | - | 24.7 | 23.1; 26.1 | - | 25.6 | 24.9; 26.3 | 0.307 |
| Coordinated health care | 70.8 | - | - | 65.6 | - | - | 0.613 |
| Presence of risk factors | | | | | | | |
| Yes (n=90); no (n=88) | | | | | | | |
| Age (years) | - | 58.5 | 57.5; 59.5 | - | 58.7 | 57.8; 59.6 | 0.353 |
| BMI | - | 25.2 | 24.3; 26.0 | - | 25.8 | 24.8; 26.7 | 0.366 |
| Coordinated health care | 65.6 | - | - | 67.1 | - | - | 0.833 |

Source: Own elaboration.

FRAX® = Fracture Risk Assessment Tool. \bar{x} = Mean; BMI = body mass index; DXA = dual-energy x-ray absorptiometry.

DISCUSSION

The results of our study allowed us to make precise estimates of the proportion of DXA scans conducted in 2011 in women who did not meet the minimum screening criteria, as well as the distribution of the scan results and the proportion of patients that were prescribed drugs involved in calcium and phosphorous metabolism according to their electronic medical records.

Our results are consistent with those observed in countries outside of Latin America, as in the case of the study published by Schnatz *et al.* in a population of 600 postmenopausal women attending private radiology sites in Hartford, Connecticut (USA) between 2007 and 2009. The authors found that 41.3% of DXA scans had been carried out with patients that did not meet the screening criteria of the North American Menopause Society.⁽¹⁹⁾ The appropriateness of requests for DXA scans was also evaluated for patients in the ESOSVAL cohort of Valencia (men and women between 50 and 74 years of age), in which one in ten patients for whom a DXA scan was requested did not meet the screening criteria of multiple medical associations.⁽²³⁾

Consistent with these results, a controlled case study conducted in Buenos Aires concluded that consistent care provision by specialists would increase the chance of an inappropriate request for screening by DXA.⁽¹⁸⁾ Nonetheless, our study is the first in Argentina to include primary sources of information in addition to secondary data found in medical histories. This primary data, gathered by telephone interviews with women who had undergone a DXA scan, was collected in order to avoid categorizing as “over-screened” those women whose risk was greater than that which had been recorded in their medical records. Special mention should be made of the fact that out of the population at low risk for osteoporotic fragility fracture, densitometric osteopenia was found in 61% of cases and densitometric osteoporosis was found in 5.8% – despite the fact that this population did not meet screening criteria according to current consensus, and therefore should not

have undergone DXA.^(11,12,13,14) The event that healthcare actions must seek to prevent is an osteoporotic fragility fracture; therefore, therapeutic decisions should be made in accordance to the risk for this type of lesion, and not solely in response to isolated bone mineral density results.^(15,16,24) These statements are supported by the results published by Kanis *et al.*, who found that the probability for fracture depended much more on age than on a single bone mineral density result.⁽²⁵⁾ In other words, even if a woman with low baseline risk for osteoporotic fragility fracture obtained low values of bone mineral density with respect to the reference population (healthy 30-year-olds), it is very unlikely that she would benefit from anti-resorptive therapy, given that the impact of the treatment will depend on her post-test probability for osteoporotic fragility fracture – and this probability results from the combination of information obtained via DXA scans with information on previously existing risk factors. Therefore, it would be incorrect to conclude that a person with low baseline risk for osteoporotic fragility fracture has *densitometric osteoporosis* based on a single test with results showing a value that diverges from the average reference value. Indeed, the determination of the reference value is in and of itself debatable, as the appropriateness of using as a reference a population 20 years younger than the population to which this test is applied massively (those aged 50-and-over) is doubtful. It is very probable that of the 60% of DXA scans with “abnormal” findings, the majority are cases of overdiagnosis, which increases the probabilities for over-medication and labeling. As noted by Zárate *et al.*, there is no support for prescribing pharmacological treatments to patients with *densitometric osteoporosis* who have no risk factors for osteoporotic fragility fracture, and even less so for treating patients with isolated *osteopenia*,⁽²⁶⁾ while Sosa Henríquez *et al.* contend that the concept of osteopenia is a theoretical construction that was developed for epidemiological purposes and has questionable clinical utility.⁽²⁷⁾ We therefore consider that the osteopenia found in nearly 60%

of women at low risk for osteoporotic fragility fracture could only have generated in the patients concern, expense, and adverse drug side effects, with no evidence that this finding could have brought about potential benefits to their health.^(24,28)

Limits of our study

Regarding the analysis of possible predictors, we did not detect association between the presence of "over-screening" (or inappropriate screening in women at low risk of osteoporotic fragility fracture) and having health care coordinated by a primary care physician. However, our study did not have enough analytic power to detect any such difference, since the sample size was calculated on the basis of our primary objective. This study was conducted with a population enrolled in the private healthcare subsystem of the Autonomous City of Buenos Aires and Greater Buenos Aires, which means that we must be cautious in extrapolating

its conclusions to other population groups. Our response rate was slightly lower (44.4%) than that which was reported in population-based studies in other countries (56%). Nonetheless, there do not appear to have been systematic differences between the subgroup that was contacted and that which was not⁽²⁹⁾ (Table 1).

CONCLUSION

Nearly half of the women who underwent a DXA scan did not meet the minimum criteria for osteoporosis screening, even according to the most liberal screening criteria. We consider that the inadequate prescription of DXA can lead to women with a low global risk for osteoporotic fragility fracture being labeled as "cases" of osteoporosis/osteopenia, and subjected to unnecessary and potentially harmful treatments, in addition to the subsequent strain on human and economic resources in health care which could have been put to better use.

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REFERENCES

1. Schurman L, Bagur A, Claus-Hermberg H, Messina OD, Negri AL, Sánchez A, et al. Guías

2012 para el diagnóstico, la prevención y el tratamiento de la osteoporosis. *Medicina (Buenos Aires)*. 2013;73(1):55-74.

2. World Health Organization. What evidence is there for the prevention and screening of osteoporosis? [Internet]. Copenhagen: WHO; 2006 [cited 18 May 2015]. Available from: <http://goo.gl/llxYlj>.

3. Spivacow FR, Sánchez A. Epidemiology, costs, and burden of osteoporosis in Argentina. *Archives of Osteoporosis*. 2010;5(1):1-6.

4. Consensus Development Conference. Diagnosis, prophylaxis and treatment of osteoporosis. *American Journal of Medicine*. 1993;94(6):646-650.

5. Kanis JA, Melton LJ, Christiansen C, Johnston CC, Khaltaev N. The diagnosis of osteoporosis. *Journal of Bone and Mineral Research*. 1994;9(8):1137-1141.
6. National Osteoporosis Foundation. *Clinician's guide to prevention and treatment of osteoporosis*. Washington DC: National Osteoporosis Foundation; 2014.
7. U.S. Preventive Services Task Force. Screening for osteoporosis: U.S. preventive services task force recommendation statement. *Annals of Internal Medicine*. 2011;154(5):356-364.
8. Qaseem A, Snow V, Shekelle P, Hopkins R Jr, Forciea MA, Owens DK, Clinical Efficacy Assessment Subcommittee of the American College of Physicians. Pharmacologic treatment of low bone density or osteoporosis to prevent fractures: a clinical practice guideline from the American College of Physicians. *Annals of Internal Medicine*. 2008;149(6):404-415.
9. Lim LS, Hoeksema LJ, Sherin K, ACPM Prevention Practice Committee. Screening for osteoporosis in the adult U.S. population: ACPM position statement on preventive practice. *American Journal of Preventive Medicine*. 2009;36(4):366-375.
10. Kanis JA, Oden A, Johansson H, McCloskey E. FRAX® y la evaluación de la probabilidad de fractura: introducción. *Revista Metabolismo Óseo y Mineral*. 2010;8(1):15-18.
11. Claus-Hermberg H, Bagur A, Messina OD, Negri AL, Schurman L, Sánchez A. FRAX®: un nuevo instrumento para calcular el riesgo absoluto de fracturas a 10 años. *Medicina (Buenos Aires)*. 2009;69(5):571-575.
12. FRAX® WHO Fracture Risk Assessment Tool [Internet]. World Health Organization Collaborating Centre for Metabolic Bone Diseases [cited 15 May 2015]. Available from: <http://goo.gl/CPiWYR>.
13. The North American Menopause Society. Management of osteoporosis in postmenopausal women: 2006 position statement of the NAMS. *Menopause*. 2006;13:340-367.
14. Papaioannou A, Morin S, Cheung AM, Atkinson S, Brown JP, Feldman S, et al. 2010 clinical practice guidelines for the diagnosis and management of OP in Canada. *CMAJ*. 2010;182(17):1864-1873.
15. Moniyan R, Cassels A. *Selling sickness: How the world's biggest pharmaceutical companies are turning us all into patients*. New York: Nation Books; 2006.
16. Järvinen TLN, Michaëlsson K, Jokihaara J, Collins GS, Perry TL, Mintzes B, et al. Overdiagnosis of bone fragility in the quest to prevent hip fracture. *BMJ*. 2015;350:h2088.
17. Järvinen TLN, Sievänen H, Khan KM, Heinenon A, Kannus P. Shifting the focus in fracture prevention from osteoporosis to falls. *BMJ*. 2008;336:124-126.
18. Ortuño M, Clavijo M, García Allende N, Popoff F, Aizpurua F, Izcovich A, Catalano H. Uso y sobreuso de la densitometría ósea como método de screening de osteoporosis. *Revista Argentina de Medicina*. 2013;1(1):13-16.
19. Schnatz PF, Marakovits KA, Dubois M, O'Sullivan DM. Osteoporosis screening and treatment guidelines: are they being followed? *Menopause*. 2011; 18:1072-1078.
20. Gérvas J, Pérez Fernández M. Cribados: una propuesta de racionalización. *Gaceta Sanitaria*. 2013;27:372-373.
21. Reid R, Haggerty J, McKendry R. Defusing the confusion: Concepts and measures of continuity of care [Internet]. Ottawa: Fondation Canadienne de la Recherche sur les Services de Santé; 2002 [cited 10 May 2015]. Available from: <http://goo.gl/4e5NPB>.
22. Organización Panamericana de la Salud. Buenas Prácticas Clínicas: Documento de las Américas. [Internet]. OPS/OMS; 2005 [cited 10 May 2015]. Available from: <https://goo.gl/T1rxWI>.
23. Hurtado I, Sanfélix-Gimeno G, Baixauli-Pérez C, Peiró S, Sanfélix-Genovés J. Impact on the population of different bone mineral density testing criteria and appropriateness of densitometries in the ESOSVAL cohort, Spain. *Journal of Clinical Endocrinology and Metabolism*. 2014;99(1):142-150.
24. U.S. Department of Health and Human Services. Bone Health and Osteoporosis: A Report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Office of the Surgeon General; 2004.
25. Kanis J, Johnell O, Oden A, Dawson A, De Laet C, Jonsson B. Ten year probabilities of osteoporotic fracture according to BMD and diagnostic thresholds. *Osteoporosis International*. 2001;12(12):989-995.
26. Zárate A, Saucedo R. Controversia sobre el manejo de la osteopenia. *Acta Médica Grupo Angeles*. 2003;1(4):241-242.

27. Sosa Henríquez M, Gómez de Tejada Romero MJ. El término osteopenia y el riesgo de fractura. *Anales de Medicina Interna (Madrid)*. 2006;23(4):151-152.

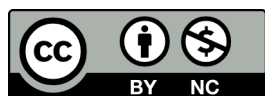
28. Khosla S, Melton L. Osteopenia. *New England Journal of Medicine*. 2007;356:2293-2300. doi: 10.1056/NEJMc070341.

29. Galán I, Rodríguez Artalejo F, Zorrilla B. Reproducibilidad de un cuestionario telefónico sobre factores de riesgo asociados al comportamiento y las prácticas preventivas. *Gaceta Sanitaria*. 2004;18:118-128.

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