# Round Table

# Strong bones in later life: luxury or necessity?

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Osteoporosis is a global problem which will increase in significance as the population of the world both increases and ages. This report looks at how the demographic changes in different countries of the world will be reflected in the incidence and cost of osteoporotic disease. Comparisons are made between the data collected by the European Union's Report on Osteoporosis in the European Community, issued in June 1998, and some of the data available from other parts of the world. The importance of prevention, early detection and appropriate treatment is stressed, as well as the need for national health services to provide reimbursement of the costs of prevention, diagnosis and treatment for high-risk groups.

*Voir page 420 le résumé en français. En la página 421 figura un resumen en español.*

## Osteoporosis: the disease

Osteoporosis is a disease characterized by a loss of bone mass and density and the disruption of the normal bone architecture. The resulting reduced bone strength leads to a greatly increased risk of the bone fracturing, even under small stresses. Bone pain and fragility have a major impact on quality of life: sufferers from osteoporosis can have their bones broken by a handshake or a hug, or experience back pain that makes lifting the slightest weight impossible.

Although widely seen as "an old woman's disease", osteoporosis occurs in both men and women, and can do so at any age. Women, however, show a particularly marked rise in osteoporosis risk after their oestrogen production falls at menopause. In the first five years after menopause, some women may lose as much as 15% of their bone mass (*1*). In both sexes, increasing age correlates strongly with an increased risk of osteoporosis, and the incidence of osteoporotic fractures is highest in those aged over 80, where the fragility of the bone is compounded by an increased vulnerability to falls.

In June 1998, the European Union produced a report on osteoporosis in the European Community (*2*). It gathers extensive data on the incidence of osteoporosis in Member States of the European Community, and on its prevention, diagnosis and treatment. It also makes recommendations for action against osteoporosis, which include adopting osteoporosis reduction as a major health care target, monitoring fracture rates, coordinating resource allocation, providing nutritional guidelines, ensuring that optimal treatment strategies are devised and provided, and funding research.

## A global problem

Worldwide, the lifetime risk for osteoporotic fractures in women may be as high as 40%; in men it is 13%. It is estimated that osteoporosis affects one in three post-menopausal women. It affects the majority of elderly people, and the population of the world is ageing in the developing world as much as in industrialized countries. An increasing number of people are over 65 years old and, most importantly for the prevalence of osteoporosis, the proportion of the population aged over 80 will increase rapidly in the coming years. In the 15 Member States covered in the European Union's report, it is estimated that the number of people in this age group will rise from 8.9 million women and 4.5 million men in 1995 to 26.4 million women and 17.4 million men by 2050.

Similar transitions are anticipated in countries outside Europe. For example, Japan anticipates that its proportion of people over 65 years old will increase from 16% of the population in 1998 to 21.5% in 2010, with the proportion of oldest elderly (over 80) increasing from 3.4% to 5.7% in the same period (see Table 1). Worldwide, the ageing of the population means that the overall prevalence of osteoporosis and related fractures will increase substantially, with concomitant increases in health care costs and human suffering.

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Table 1. **Demographic changes in the population of selected countries**

| Country | Total population[a] | | *N* (%) > 65 | | *N* (%) > 80 | |
|---|---|---|---|---|---|---|
| | 1998 | 2010 | 1998 | 2010 | 1998 | 2010 |
| Japan | 125 932 | 127 142 | 20 164 (16) | 27 313 (21) | 4338 (3.4) | 7206 (5.7) |
| China | 1 236 915 | 1 334 486 | 81 992 (6.6) | 109 597 (8.2) | 10 462 (0.8) | 17 025 (1.3) |
| Australia | 18 613 | 20 434 | 2307 (12.4) | 2929 (14.3) | 536 (2.9) | 851 (4.2) |
| India | 984 004 | 1 182 171 | 45 330 (4.6) | 63 740 (5.4) | 5746 (0.6) | 9684 (0.8) |
| United States | 270 312 | 298 026 | 34 285 (12.7) | 39 409 (13.2) | 8716 (3.2) | 11 228 (3.8) |
| Hungary | 10 208 | 9963 | 1204 (11.8) | 1605 (16.1) | 254 (2.5) | 392 (3.9) |
| Lebanon | 3506 | 4164 | 226 (6.4) | 287 (6.9) | 31 (0.9) | 56 (1.3) |

[a] Population in thousands. Source: US Bureau of the Census, International Data Base.

## Hip and spine fractures

The major osteoporotic complications are fractures of the hip and of the spine. The mortality rate for those suffering hip fractures varies from 15% to 30% (*3*, *4*) owing to secondary complications such as pneumonia. Hip fractures are associated with considerable morbidity, lengthy hospital admissions and a correspondingly large economic burden. In the European Union's Report, data on hip fractures showed that the incidence and male: female distribution of fracture vary considerably between countries. For example, data from 1995 show that the incidence of hip fracture in French women is 440 per 10 000 of the population over 50 years of age, while in Sweden it is 859 (*2*). In Japan, the comparable 1992 figure for women is 579 (for men it is 187) (*5*). Osteoporosis may turn out to be a particular problem in India, where osteoporotic fractures tend to occur on average 10–20 years earlier and with a higher male to female ratio than among Westerners (*6*).

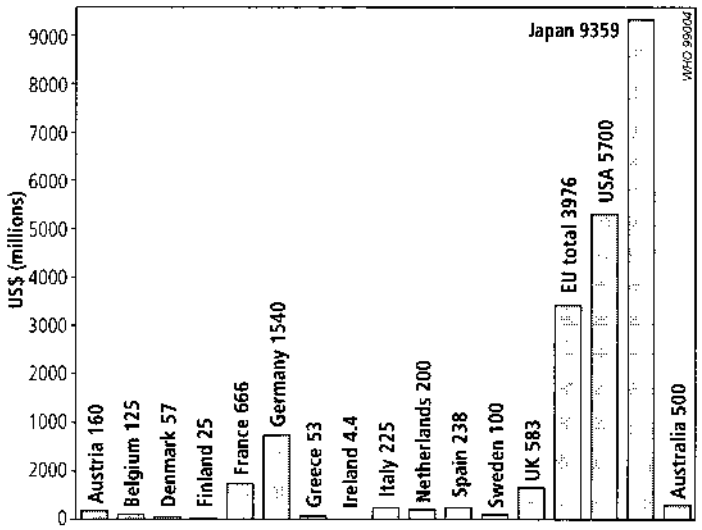
Worldwide, the number of hip fractures could rise from 1.7 million in 1990 to 6.3 million by 2050, with the most dramatic rise expected to be in Asia over the next few decades (*7*) as the population there both grows and ages. As demographic forecasts for different countries differ, so do the predicted changes in the incidence of osteoporosis-related hip and other fractures. In the Netherlands, the incidence of hip fracture in women is predicted to increase most rapidly between 2025 and 2035 and more slowly in the years before and after, while in Italy there will be a steady rate of increase in both sexes over the next 50 years. A moderately steady increase in osteoporosis among women over the next 20 years is also predicted for Australia, with a sharper rise in the following 10 years. The incidence of vertebral fractures shows similar trends. In some cases (such as Hungary) the projection is complicated by the fact that the total population is decreasing at the same time as the incidence of osteoporotic fracture is increasing due to demographic shifts.

## Economic cost

Although few accurate global or local estimates are available, the financial cost of osteoporosis is undoubtedly high. Within the European Union, over 3500 million Euro (approximately US$ 3976 million) each year are needed for the direct hospital costs of hip fractures alone (Fig. 1). The hospital costs following hip fracture in some non-European countries in 1996 include approximately US$ 60 million in Hungary, US$ 500 million in Australia, US$ 5700 million in the United States, and an astonishing US$ 9359 million in Japan. The cost per person also varies, for instance from US$ 12 000 in Australia to US$ 8700 in the Lebanon. It should also be borne in mind that these figures only represent the direct hospital costs; primary, outpatient and institutional care may multiply the real cost of hip fractures by 2.5.

The projected need for hospital beds to treat patients with hip and vertebral fractures in the EU Member States, as estimated in the EU Report, is shown in Table 2. The proportion of all hospital beds used for patients with hip or vertebral fractures is predicted to rise from 0.88% to 1.97%. A similar pattern is shown in the available data from non-European countries and it is likely that the same trend will be seen globally.

Fig. 1. **1996 estimated total direct hospital costs arising from hip fractures in the European Union, United States, Japan and Australia**




Source: Summary Report on Osteoporosis in the European Community - Action for Prevention

A recurring theme in the stories is that sufferers experience years of pain, and even multiple fractures, before their condition is properly diagnosed. In many parts of the world, unfortunately, osteoporotic symptoms are still considered to be a natural result of growing old. As one doctor put it: "My medical school and residency training in India during the 1970s and 1980s did not equip me to recognize that these deformities were the sequel of a serious disease process and not a natural consequence of ageing" (*8*). It needs to be made much more widely known that osteoporosis is a disease which can be successfully prevented, diagnosed, treated and managed by means of relatively simple interventions. Experts agree that prevention, and the education of professionals and the public about these interventions, are priorities. As Dr Poór points out, consistent and widespread use of secondary prevention (aimed at those in whom intervention may inhibit disease progression) should be used to identify patients at risk of rapid bone loss, and provide early treatment for them (*9*).

Table 2. **Estimated need for hospital beds for patients with hip/vertebral fractures in European Union (EU) Member States and USA**

| Parameter | Year | | | | | |
|---|---|---|---|---|---|---|
| | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 |
| Estimated hip fracture incidence (x1000): | | | | | | |
| EU | 414 | 495 | 595 | 719 | 861 | 972 |
| USA | 337.4 | 417.7 | 490.9 | 560 | 598.9 | 650 |
| Vertebral fracture factor[a] | 1.1 | 1.09 | 1.08 | 1.07 | 1.06 | 1.05 |
| Beds required | | | | | | |
| EU | 25 000 | 30 000 | 35 000 | 42 000 | 50 000 | 56 000 |
| USA | 11 000 | 13 600 | 16 000 | 18 250 | 19 500 | 21 200 |
| % of available beds: EU (US data not available) | 0.88 | 1.06 | 1.23 | 1.48 | 1.76 | 1.97 |

[a] Assuming that vertebral fracture incidence at present is equal to hip fracture incidence, that 10% of vertebral fracture patients need hospital care in the acute phase and that the length of hospital stay is on average 20 days in the EU and 10.8 days in the USA for both hip and vertebral fractures, the demand for hospital beds for the vertebral fracture population is currently 10% of that for patients with hip fracture. The total demand for beds is therefore 1.1-times the number of hip fractures in the year 2000. Thereafter, it is assumed that the vertebral fracture incidence will increase at half the rate of the increase in hip fracture incidence.

Sources: EU data, EU Report, Table 1.7; US data, Dr M McClung, questionnaire response.

## Human cost of osteoporosis

A financial evaluation should not divert attention from the human cost of osteoporosis, which can include years of debilitating pain, deformity, loss of height, and diminishing quality of life. The EU Report highlighted individual cases to show the impact the disease has on a sufferer's life. They include the baker who had to change jobs because back pain prevented him from lifting trays of dough; the woman who cannot remember when she last had a night's sleep uninterrupted by pain; the man who was the same height as his wife at the time of his wedding in 1972 and is now considerably shorter (*2*).

## Prevention and early detection

The EU Report highlights the importance of prevention and early detection in sufferers. Osteoporosis has been called "the silent disease" because by the time any symptoms (pain and fractures) become apparent, the disease process is already far advanced. X-rays will only detect bone loss by the time 25–40% of bone mass has already gone. Techniques of bone densitometry, however, now allow loss of bone mass to be detected at a very early stage. These methods give reliable and accurate estimates of bone density and should be used in all

individuals who possess significant risk factors if the result will influence their clinical management.

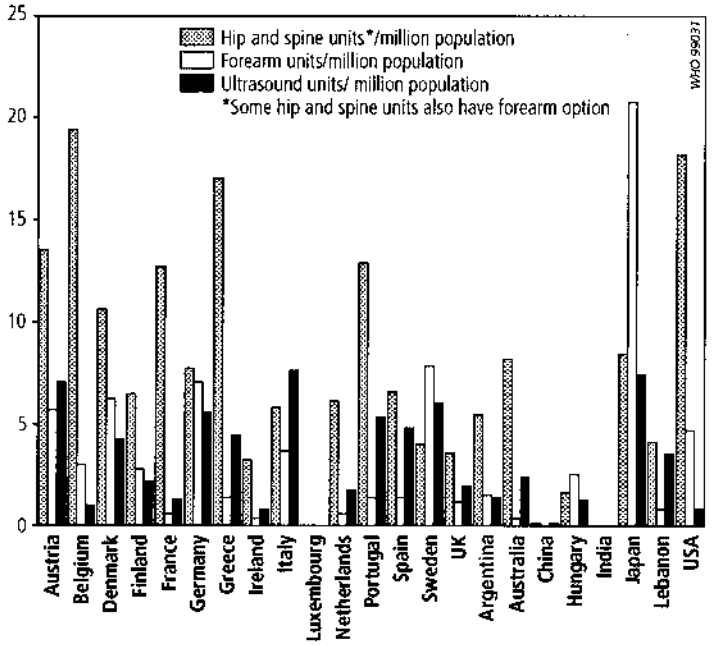
Unfortunately, the worldwide availability of bone densitometry equipment is highly variable (Fig.2). In countries such as Argentina, Australia, Japan and Lebanon, osteoporosis experts consider the national availability of bone mineral density (BMD) equipment to be adequate for the diagnosis of osteoporosis. Clearly, however, this is a matter of opinion, and even in countries with a relatively high availability, such as the United States, some experts believe it is still inadequate for proper diagnosis. The same can certainly be said of less affluent European countries such as Hungary or Ireland, and of others such as India or China. By January 1998, for example, there were still only four dual X-ray densitometers available for the entire Indian subcontinent. Recent feedback from specialists and national osteoporosis societies suggests in any case that BMD measurement is widely underutilized in the diagnosis of osteoporosis, partly because of scarcity of equipment (as in Denmark, Hungary and Ireland for example), and partly due to restrictions in the personnel allowed to perform bone densitometry (as in Belgium and Italy) (*10*).

The most important factor, however, is the provision for reimbursement of the cost of BMD measurement. Many national health systems, such as those of the Netherlands and Switzerland, provide full reimbursement for BMD measurement, but others permit only partial reimbursement, and others none (e.g. France, Ireland). Reimbursement is qualified as partial here if it is provided only in some regions, for only part of the cost, or only in certain circumstances. Some countries currently reimbursing BMD measurement are planning to stop doing so to cut costs. This seems to reflect a short-sighted approach to cost cutting: osteoporosis is a slow, chronic disease, and detection now will yield great financial benefits by preventing osteoporotic fractures in the longer term.

To make BMD measurement available to those at risk, the risk factors have to be properly characterized. Many of them have been identified but these data do not yet serve as very accurate or sensitive predictors of fracture (*11, 12*). Postmenopausal women who are not taking hormone replacement therapy stand out clearly as a group at risk. For men, however, the risk indicators are less clearly characterized, and more research in general is needed to identify those most in need of BMD measurement.

Most countries now have some form of diagnostic and treatment guidelines for osteoporosis. These have usually been established by scientific or medical societies, rather than by government or health authorities, though in Finland, Sweden and the United Kingdom governments have produced their own national reports and objectives. The EU Report strongly recommended the coordination and harmonization of therapeutic guidelines throughout the EU Member States, and osteoporosis experts from other countries agree that it is necessary to standardize treatment strategies (questionnaire response).

Fig. 2. **An estimate of bone densitometry equipment (units/million population) as at the beginning of 1998**

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Despite governmental acceptance of guidelines for diagnosis and treatment, and despite the availability of effective treatments, the health insurance schemes of many countries do not cover the accepted therapeutic regimens. For example, in addition to hormone replacement, other treatments such as bisphosphonates, estrogen analogues and calcitonin have been shown to reduce the incidence of new vertebral fractures in osteoporosis patients. The cost of such treatments for osteoporosis may be only partially reimbursed, or reimbursed only in highly restricted circumstances. In Japan for example these medications are reimbursed but there are restrictions if more than two medicines are prescribed for the same patient. The generation of cost-effectiveness data for newly-approved osteoporosis medications has been suggested as vital here (questionnaire response).

Guidelines for the recommended intakes of calcium and vitamin D, two nutritional factors with proven beneficial effects on bone health in all age groups, also exist. These recommendations vary between countries, for reasons that may take into account local variations in diet and environment. For example, the Institute of Medicine of the USA recommends a calcium intake of 1000 mg/day for adults between 31 and 50 years of age; the European Community's Population Reference intake for the same group is 700 mg/day, while in Japan it is 600 mg/day. The current daily calcium intake recommended by the Indian Council of Medical

Research is one-third to one-half that of the National Institutes of Health Consensus Panel, a difference which had been described as "astonishing" (*13*). More importantly, although osteoporosis specialists note that it is important to have data on actual calcium and vitamin D intake, in reality this information is usually lacking (*13*). Lack of data means that the degree of shortfall, and the population groups that are most likely to be at risk because of inadequate intake, are not precisely known.

In fact many experts would agree that, overall, there is a lamentable lack of accurate data on osteoporosis. Acquiring information, particularly on the incidence and prevalence of osteoporotic fractures, on specifying risk factors, and on the cost-effectiveness of interventions in different at-risk groups, is a key recommendation of the EU Report. This goes hand in hand with attempts to raise awareness of osteoporosis among the public and professionals alike. The importance of education was stressed in the EU Report and is a recurring theme in comments from experts throughout the world. The Japanese Ministry of Health and Welfare for example stresses the importance of dissemination of knowledge for helping to prevent osteoporosis: health education services, general health consultation services, and health examinations for women 40 to 50 years old have been planned (questionnaire response). How successful such campaigns can be is shown in the case of Lebanon. Polls show that 77% of the Lebanese population is aware of osteoporosis: this is the highest national level of awareness in the world and is attributable to the efforts of the Lebanese Osteoporosis Prevention Society, which specifically included public education in its programme.

## Concluding note

Osteoporosis is a disease which can be prevented, diagnosed and managed with the help of relatively simple interventions. Unfortunately, many health agencies are reluctant to authorize the use or reimbursement of these interventions. This is partly because they believe the appropriate target risk groups have not been clearly identified, even though it is clear that two such groups are post-menopausal women below the age of 65 not taking hormone replacement therapy and with one or more additional clinical risk factors, and all women over 65 not taking hormone replacement therapy. Another problem is that the cost-effectiveness of these interventions has to be evaluated over many years. A major effort is required to educate both the public and professionals about osteoporosis and how to detect it at an early stage. This will help to ensure that in the future, as many people as possible have strong bones in later life. ■

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## Résumé

### Des os solides au troisième âge — un luxe ou une nécessité ?

L'ostéoporose est une maladie qui se caractérise par une réduction de la masse et de la densité des os. Elle peut survenir à tout âge chez l'homme comme chez la femme, mais le risque augmente avec l'âge, notamment chez la femme après la ménopause. Il s'agit en outre d'un problème mondial. Dans l'ensemble du monde, le risque de fracture ostéoporotique au cours de l'existence atteint 40% chez la femme et 13% chez l'homme, la majorité des personnes âgées étant touchées. A mesure que la population du monde avance en âge et que la proportion des plus de 65 ans augmente, la prévalence globale de l'ostéoporose s'accroît, entraînant un gonflement des dépenses de santé correspondantes, sans compter les souffrances pour les malades.

Les principales complications de l'ostéoporose consistent en fractures au niveau du bassin et du rachis. On estime que le nombre de fractures du bassin dans le monde passera de 1,7 millions en 1990 à 6,3 millions en 2050, l'Asie devant connaître l'augmentation la plus spectaculaire. Dans les pays de l'Union européenne, on prévoit que la proportion de lits d'hôpital destinés à recevoir des malades ostéoporotiques passera de 0,88 à 1,97% et les données relatives aux pays non européens révèlent une évolution identique. Le coût financier sera élevé. A l'intérieur de l'Union européenne, les dépenses hospitalières directes pour les seules fractures du bassin dépassent 3,5 milliards d'euros. Il ne faut cependant pas perdre de vue que derrière cette évaluation purement financière, il y a le coût humain de la maladie, avec les douleurs, les difformités et la diminution de la qualité de vie qu'elle entraîne au fil des années.

Une publication récente, le *Rapport sur l'ostéoporose dans la Communauté européenne*, souligne l'importance de la prévention et d'un dépistage précoce de l'ostéoporose. Même s'il est vrai que la maladie peut être prévenue, diagnostiquée, traitée et prise en charge avec succès par des moyens relativement simples, le fait est que dans de nombreux pays, la maladie n'est ni suffisamment reconnue ni correctement prise en charge. La densitométrie osseuse permet d'effectuer des mesures fiables et devrait être pratiquée sur toutes les personnes exposées à un risque notable. C'est une technique qui

n'est malheureusement pas disponible partout dans le monde et que l'on utilise souvent parcimonieusement par suite des restrictions imposées au remboursement : il est possible que les responsables de l'assurance-maladie pensent plutôt aux économies immédiates qu'aux avantages à long terme. En outre, dans certains pays, le régime d'assurance-maladie ne couvre pas le coût des thérapeutiques admises.

Les spécialistes s'accordent à reconnaître que l'on manque de données précises sur l'ostéoporose. Le rapport de l'Union européenne recommande notamment de recueillir davantage de données sur l'incidence et la prévalence des fractures ostéoporotiques, les facteurs de risque spécifiques et la rentabilité des interventions dans divers groupes à risque. Toujours de l'avis des spécialistes, il importe de sensibiliser davantage les hommes politiques, les professions de santé et les patients à cette maladie.


## Resumen

### Huesos fuertes en la tercera edad: ¿un lujo o una necesidad?

La osteoporosis es una enfermedad que se caracteriza por una reducción de la masa ósea y de la densidad de los huesos. Se puede presentar tanto en los hombres como en las mujeres, y a cualquier edad, pero los riesgos aumentan con los años, en particular entre las mujeres posmenopáusicas. La osteoporosis también constituye un problema mundial. En el mundo, el riesgo de fractura por osteoporosis a lo largo de la vida alcanza un 40% entre las mujeres y un 13% entre los hombres, y afecta a la mayor parte de las personas de edad. A medida que aumenta la edad de la población mundial y la proporción de personas mayores de 65 años, aumentan también la prevalencia general de la osteoporosis, los costos asistenciales asociados y el sufrimiento de los pacientes.

Las complicaciones más importantes de la osteoporosis son las fracturas de cadera y de la columna vertebral. A nivel mundial, se calcula que el número de fracturas de cadera aumentará de 1,7 millones en 1990 a 6,3 millones en 2050, y los aumentos más espectaculares se registrarán en Asia. Se prevé que, en los países de la Unión Europea, la proporción de camas de hospital que necesitarán los pacientes con fracturas de cadera o columna vertebral por osteoporosis aumentará del 0,88% al 1,97% del total, y los datos de países no europeos revelan tendencias parecidas. El costo financiero será elevado. En la Unión Europea, los gastos directos de hospitalización por fractura de cadera representan por sí solos más de 3500 millones de euros al año. No debe olvidarse sin embargo que una evaluación estrictamente financiera oculta el costo humano de la osteoporosis, que comprende años de dolor, deformidad y pérdida de la calidad de vida.

En el informe sobre la osteoporosis en la Comunidad Europea, recientemente publicado, se destacó la importancia de la prevención y de la detección temprana de la osteoporosis. Aunque es posible prevenir, diagnosticar, tratar y controlar la enfermedad con buenos resultados mediante intervenciones relativamente sencillas, el hecho es que en muchos países el reconocimiento del problema de la osteoporosis y el acceso a las intervenciones destinadas a corregirla son insuficientes. Las técnicas de densitometría ósea proporcionan estimaciones fiables de la densidad ósea y deben utilizarse para examinar a todas las personas que presenten factores de riesgo significativos. Sin embargo, la disponibilidad mundial de la densitometría ósea es muy variable, y a menudo se la utiliza insuficientemente debido a restricciones relativas al reembolso de los gastos; los servicios de seguro médico tienden a concentrar la atención en la eficacia inmediata en relación con los costos antes que en los beneficios a largo plazo. Además, los planes de seguro médico de muchos países no cubren pautas de tratamiento aceptadas.

Por otra parte, los expertos están de acuerdo en que hay una escasez general de datos precisos sobre la osteoporosis. Las principales recomendaciones del informe de la Unión Europea se refieren a la obtención de información adicional sobre la incidencia y la prevalencia de las fracturas por osteoporosis, los factores de riesgo específicos y la eficacia en relación con los costos de las intervenciones en diferentes grupos de riesgo. Los expertos han puesto también de relieve la necesidad de sensibilizar a los políticos, profesionales y pacientes acerca del problema de la osteoporosis.


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