Pre-print summary

Osteoporosis in the European Union: Medical Management, Epidemiology and Economic Burden

A report prepared in collaboration with the International Osteoporosis Foundation (IOF) and the European Federation of Pharmaceutical Industry Associations (EFPIA).

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All authors have received research funding from pharmaceutical companies involved in marketing products for treatment of osteoporosis. Competing interests have been lodged with IOF.

Abstract

Summary

This report describes the epidemiology, burden, and treatment of osteoporosis in the 27 countries of the European Union (EU27).

Introduction

Osteoporosis is characterized by reduced bone mass and disruption of bone architecture, resulting in increased risk of fragility fractures which represent the main clinical consequence of the disease. Fragility fractures are associated with substantial pain and suffering, disability and even death for affected patients and substantial costs to society. The aim of this report was to characterize the burden of osteoporosis in the EU27 in 2010 and beyond.

Methods

The literature on fracture incidence and costs of fractures in the EU27 was reviewed and incorporated into a model estimating the clinical and economic burden of osteoporotic fractures in 2010.

Results

22 million women and 5.5 million men were estimated to have osteoporosis; and 3.5 million new fragility fractures were sustained, comprising 610,000 hip fractures, 520,000 vertebral fractures, 560,000 forearm fractures and 1,800,000 other fractures (i.e. fractures of the pelvis, rib, humerus, tibia, fibula, clavicle, scapula, sternum and other femoral fractures). The economic burden of incident and prior fragility fractures was estimated at € 37 billion. Incident fractures represented 66% of this cost, long-term fracture care 29% and pharmacological prevention 5%. Previous and incident fractures also accounted for 1,180,000 quality-adjusted life years lost during 2010. The costs are expected to increase by 25% in 2025. The majority of individuals who have sustained an osteoporosis-related fracture or who are at high risk of fracture are untreated and the number of patients on treatment is declining.

Conclusions

In spite of the high social and economic cost of osteoporosis, a substantial treatment gap and projected increase of the economic burden driven by the aging populations, the use of pharmacological interventions to prevent fractures has decreased in recent years, suggesting that a change in healthcare policy is warranted.

Foreword

Osteoporosis, literally “porous bone”, is a disease characterized by weak bone. It is a major public health problem, affecting hundreds of millions of people worldwide, predominantly postmenopausal women. The main clinical consequence of the disease is bone fractures. It is estimated that one in three women and one in five men over the age of fifty worldwide will sustain an osteoporotic fracture. Hip and spine fractures are the two most serious fracture types, associated with substantial pain and suffering, disability, and even death. As a result, osteoporosis imposes a significant burden on both the individual and society. During the past two decades, a range of medications has become available for the treatment and prevention of osteoporosis. The primary aim of pharmacological therapy is to reduce the risk of osteoporotic fractures.

The objective of this report is to review and describe the current burden of osteoporosis and highlight recent advances and ongoing challenges for treatment and prevention of the disease. The report encompasses both epidemiological and health economic aspects of osteoporosis and osteoporotic fractures with a geographic focus on EU27. Projections of the future prevalence of osteoporosis and fracture incidence, the direct and total societal burden of the disease, and the consequences of different intervention strategies receive special attention. The report may serve as a basis for the formulation of healthcare policy concerning osteoporosis in general and the treatment and prevention of osteoporosis in particular. It may also provide guidance regarding the overall healthcare priority of the disease.

The report is divided into five chapters:

1. Introduction to osteoporosis
This introductory chapter briefly reviews the way in which osteoporosis and the associated fractures are defined, describes the most common osteoporotic fractures, and the extent of the burden worldwide.

2. Medical innovation and its clinical uptake in the management of osteoporosis
The second chapter reviews the measurement of bone mineral density, diagnosis of osteoporosis, methods for assessment of fracture risk, the development of interventions that reduce the risk of fractures, practice guidelines, and the cost-effectiveness of osteoporosis treatments.

3. Epidemiology of osteoporosis
The third chapter reviews the epidemiology and consequences of osteoporosis and fractures, as well as different approaches for setting intervention thresholds (i.e. at what fracture risk it is appropriate to initiate treatment).

4. Burden of fractures
The fourth chapter presents a model estimation of the burden of osteoporosis in the EU27 for 2010. The burden is described in terms of fractures, costs, and QALYs lost.

Fracture burden is also projected to the year 2025 based on expected demographic changes.

5. Uptake of osteoporosis treatments

The fifth chapter provides a description of the current uptake of osteoporosis treatments, that is, how many patients of those eligible for treatment that actually can be treated in the EU27. International sales data from 2001 and forward were used to analyse international variations in treatment uptake.

1. Introduction to osteoporosis

Summary

This introductory chapter briefly reviews the way in which osteoporosis and the associated fractures are defined, describes the most common osteoporotic fractures, and the extent of the burden worldwide.

The key messages of this chapter are:

Osteoporosis is characterized by reduced bone mass and disruption of bone microarchitecture, resulting in increased bone fragility and increased fracture risk.

In 1994 and 2008, the WHO published diagnostic criteria for osteoporosis in postmenopausal women based on the T-score for bone mineral density (BMD). Osteoporosis is defined as a value for BMD 2.5 standard deviations (SD) or more below the young female adult mean (T-score less than or equal to –2.5 SD).

Based on these diagnostic criteria, approximately 6% of men and 21% of women aged 50-84 years have osteoporosis affecting 27.6 million men and women in the EU in 2010.

The most common osteoporotic fractures are those at the hip, spine, forearm and humerus. At the age of 50 years, the remaining lifetime probability of one of these fractures is 22% and 46% in men and women, respectively.

There are very large variations in the incidence of osteoporotic fractures between and within countries for reasons that are not known, but are partly associated with economic prosperity.

Osteoporosis causes more than 8.9 million fractures annually worldwide and over one-third of all osteoporotic fractures occur in Europe.

In Europe osteoporotic fractures account for 2 million disability adjusted life years (DALYs) annually, somewhat more than are accounted for by hypertensive heart disease or rheumatoid arthritis.

The number of osteoporotic fractures is rising in many countries. Reasons for this relate in part to the increased longevity of the population. The age- and sex-specific incidence of fracture has also increased in some but not all countries.

2. Medical innovation and its clinical uptake in the management of osteoporosis

Summary

In recent years, there has been a number of advances, particularly in the measurement of BMD, diagnosis of osteoporosis, the assessment of fracture risk, the development of interventions that reduce the risk of fractures and the production of practice guidelines. This chapter describes the current state of these aspects in the field of osteoporosis. Also, the cost-effectiveness of osteoporosis treatments is addressed.

The key messages of this chapter are:

BMD forms a cornerstone for the general management of osteoporosis, being used for diagnosis, fracture risk assessment, selection of patients for treatment and monitoring of patients on treatment.

There is marked heterogeneity in the availability of DXA in the EU, and most countries have insufficient resources to implement practice guidelines.

There is an important distinction to be made between the use of BMD for diagnosis and for fracture risk assessment. Fracture risk assessment is improved by the concurrent consideration of risk factors that operate independently of BMD.

FRAX models integrate the weight of clinical risk factors (CRFs) for fracture risk, with or without information on BMD and provide estimates of the probability of fracture. Models are available for 16 member states.

Austria, Belgium Denmark, Finland, Hungary and the UK have the highest usage of FRAX. If Denmark is excluded because of exceptionally high uptake, this amounts to an average of 4,800 tests/million of the general population which is within the estimated service requirement for FRAX. The uptake of FRAX is sub-optimal in the majority of EU countries for which models are available.

Approved pharmacological interventions include bisphosphonates (BPs), strontium ranelate, raloxifene, denosumab and parathyroid hormone peptides (PTHs). These are widely available but their use is restricted by reimbursement policies. Full or near full reimbursement is available in a minority of member states. In other countries reimbursement is partial or restricted to individuals with a prior fracture or to women only. Some countries that provide reimbursement exclude PTH.

Fracture prevention with generic alendronate in women aged 50 years and older at high risk of fracture is cost-effective in most Western countries. Other treatments are cost-

effective alternatives to no treatment, particularly in patients that cannot take alendronate.

Compliance and persistence with treatment for osteoporosis are poor; approximately 50% of patients do not follow their prescribed treatment regimen and/or discontinue treatment within one year.

Measures to improve adherence will lead to more avoided fractures and are cost-effective complements to currently available treatments.

In all national treatment guidelines a case-finding approach is suggested for patient identification. However, they vary in terms of which risk factors are acknowledged, how fracture risk should be assessed and how BMD measurements should be used.

Notwithstanding the availability of guidelines, recommendations in national guidelines are not always implemented.

3. Epidemiology of osteoporosis

Summary

The objective of this chapter is to describe the epidemiology of osteoporosis and its consequences in the countries of the European Union in 2010. The information presented here forms the basis for the estimation of burden of osteoporosis presented in Chapter 4.

The key messages of this chapter are:

In 2010, it is estimated that 22 million women and 5.5 million men in the EU had osteoporosis using the diagnostic criterion of the WHO.

Incidence rates of hip fractures were available for most, but not all, countries of the EU whereas information on country-specific incidence rates of forearm, clinical vertebral fractures and other osteoporotic fractures was scarce.

The number of new fractures in 2010 in the EU was estimated at 3.5 million, comprising approximately 610,000 hip fractures, 520,000 vertebral fractures, 560,000 forearm fractures and 1,800,000 other fractures (i.e. pelvis, rib, humerus, tibia, fibula, clavicle, scapula, sternum, and other femoral fractures).

Two thirds of all incident fractures occurred in women.

Among people aged 50 years or more who were still alive in 2010, 3.3 million individuals had sustained a hip fracture (prevalence of prior hip fracture). The corresponding number of men and women with prior clinical vertebral fractures was estimated at 3.5 million men and women.

In 2010, the number of deaths causally related to fractures was estimated at 43,000. Approximately 50% of fracture related deaths in women were due to hip fractures, 28% to clinical vertebral and 22% to other fractures. Corresponding proportions for men were 47%, 39% and 14%, respectively.

4. Burden of fractures

Summary

The objective of this chapter is to estimate the burden of osteoporosis in terms of QALYs lost and total costs in the countries of the European Union in 2010. Fracture burden is also projected to year 2025 based on expected demographic changes.

Key Messages of this chapter are:

The cost of osteoporosis, including pharmacological intervention in the EU in 2010 was estimated at €37 billion. Costs of treating incident fractures represented 66% of this cost, pharmacological prevention 5% and long-term fracture care 29%.

Excluding cost of pharmacological prevention, hip fractures represented 54% of the costs, "other fractures" represented 39%, and vertebral and forearm fractures represented 5% and 1%, respectively.

The estimated number of life-years lost in the EU due to incident fractures was approximately 26,300 in 2010.

The total health burden, measured in terms of lost QALYs, was estimated at 1,180,000 QALYs for the EU. Twice as many QALYs were lost in women compared to men.

The majority of the QALYs lost were a consequence of prior fractures.

Assigning a QALY the value of 2xGDP, the total value of QALYs lost in 2010 was estimated at €61.4 billion.

Due to changes in population demography the number of men and women with osteoporosis, using the diagnostic criterion of the WHO, will rise from 27.5 million in 2010 to 33.9 million in 2025, corresponding to an increase of 23%.

The annual number of fractures will rise from 3.5 million in 2010 to 4.5 million in 2025, corresponding to an increase of 28%.

The number of QALYs lost annually due to fractures will increase from 1.2 million in 2010 to 1.4 million in 2025, corresponding to an increase of 20%.

The total cost including values of QALYs lost (valued at 2×GDP per capita) in the EU27 will rise from €99 billion in 2010 to €121 billion in 2025, corresponding to an increase of 22%.

5. Uptake of osteoporosis treatments

Summary

This chapter describes current and recent uptake of osteoporosis treatments in the European Union. Since data on the number of patients treated are not readily available in most European countries, international sales data (on volume in mg and value (€)) on drugs used for treatment of osteoporosis from IMS Health was used as a proxy. Sales data from 2001 to 2011 were analysed.

The drugs included in the analysis are alendronate, denosumab, etidronate, ibandronate, parathyroid hormone 1-84 (PTH), raloxifene, risedronate, strontium ranelate, teriparatide and zoledronic acid. Four of these drugs received marketing authorisation before 2001. The latest drug to come to market was denosumab in 2010.

The results are presented as sales and defined daily dosages (DDDs) per 100 of the total population. The number and proportion of the population above 50 years that was treated was also estimated and expressed in relation to the estimated number of patients considered eligible for treatment.

The key messages are:

Alendronate is the most commonly prescribed agent, accounting for approximately a quarter of the total value of sales. In terms of DDDs, alendronate represents almost half of all DDDs used to treat osteoporosis in the European Union.

The treatment uptake of osteoporosis drugs has increased considerably during the study time, however, recently a slight decrease has been observed.
The volume in terms of value of sales has decreased more than the volume in terms of DDDs in the two most recent years, mostly due to the decreasing price of generic bisphosphonates.

Uptake of individual treatments differs between regions in Europe. In general, Southern Europe shows a higher uptake of osteoporosis drugs.

There is a large gap between the number of women who are treated compared to the proportion of the population that could be considered eligible for treatment based on their fracture risk.