Cost-effectiveness of bisphosphonate therapies for women with postmenopausal osteoporosis: implications of improved persistence with less frequently administered oral bisphosphonates


Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
This study determined the cost-effectiveness of monthly oral bisphosphonate therapy, in post-menopausal women with established osteoporosis, in comparison with weekly therapy. The monthly bisphosphonate treatment was found to be more cost-effective than weekly treatment due to improvement in long-term compliance. The study was based on validated methodology although some sources of data were not described. The authors’ conclusions appear to be valid and supported by the extensive sensitivity analysis.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of oral bisphosphonate therapy, in post-menopausal women with established osteoporosis (vertebral fracture and bone mineral density T-score of -2.5 or less), administered monthly in comparison with weekly, to investigate the hypothesis of improved compliance in the monthly regimen.

Interventions
The three strategies compared were monthly bisphosphonate, weekly bisphosphonate, and no treatment. The bisphosphonate under examination was ibandronate sodium and this was taken for five years.

Location/setting
USA/secondary care.

Methods
Analytical approach:
This economic evaluation was based on a Markov model which was used to estimate the risk of fractures in post-menopausal women on bisphosphonate therapy or no therapy. The time horizon of the analysis was the lifetime. The authors reported that the perspective of the third-party payer was adopted.

Effectiveness data:
The clinical data came from published sources which appear to have been selected. The details of these studies were reported only for some parameters. For example, treatment efficacy and persistence with therapy were derived from randomised controlled trials (RCTs) or meta-analyses of RCTs. The risk of fractures for different age groups was based on a Swedish study, because of a lack of valid US sources. It was then adapted to represent the USA using expert opinion. The mortality rates were taken from US life tables. In general, it seems that the authors used their judgement to select the most appropriate estimate from the available evidence. Some assumptions were also made to extend the short-term data on the treatment effect and persistence to a longer time-horizon.

Monetary benefit and utility valuations:
Age-based utilities were obtained from published studies and were related to the type of fracture. The utility weights were reported, but there were no details about the instrument used to derive these estimates.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure. These were discounted at an annual rate of 3%. Fractures avoided and life-years gained were also reported, but were not combined with the costs.

Cost data:
The cost categories were drugs and health state costs (including acute care, nursing home stays, home care services, rehabilitation, post-hospital medical visits, emergency department visits, and medical device costs). The resource use and costs were derived from the published literature. Specifically, health state costs were derived from the National Osteoporosis Foundation. The average wholesale prices were used to derive drug costs. All costs were in US dollars ($) and the price year was 2006. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
A deterministic univariate sensitivity analysis was undertaken on several model parameters using ranges of values derived from the literature or defined by the authors as plus or minus 20% of the baseline value. The sensitivity analysis focused on persistence-related variables.

Results
Compared with no treatment, monthly treatment with bisphosphonates prevented 58.1 fractures per 1,000 patients while weekly treatment prevented 33.1.

The total costs were $8,345 with monthly treatment, $8,237 with weekly treatment, and $7,959 with no treatment. The expected QALYs were 2.76 with monthly treatment, 2.75 with weekly treatment, and 2.73 with no treatment.

In comparison with no treatment, the incremental cost per QALY gained was $13,749 with monthly bisphosphonate and $16,657 with weekly bisphosphonate. The incremental cost per QALY gained with the monthly over the weekly administration was $9,476.

The sensitivity analysis indicated that the most influential model inputs were efficacy of treatment for hip and vertebral fractures, annual incidence of these specific fractures, and increased mortality associated with vertebral fracture. However, in general, the base-case findings were robust to variations in the model inputs, and the monthly treatment remained cost-effective over the weekly treatment with a maximum cost per QALY of $36,584 in the worst case scenario and it always remained cost-effective compared with no treatment.

Authors’ conclusions
The authors concluded that monthly bisphosphonate treatment in post-menopausal women with established osteoporosis was more cost-effective than weekly treatment due to its associated improvement in long-term compliance.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear in that the two strategies for the timing of drug administrations were compared with each other and with no treatment.

Effectiveness/benefits:
The primary studies may have been selected because no information was provided on a literature review. The authors discussed the selection of the clinical data from the available literature, but did not provide much information on their sources, except for the treatment efficacy and persistence, which were based on RCTs, the rigorous design of which should ensure the validity of these data. The authors justified their choice of studies conducted in other locations (Sweden) due to the lack of valid local data. However, the data were adapted to the local context on the basis of expert opinion. The methods used to extend the short-term data to a long-term period were reported and appear to have been appropriate. Little information on the derivation of utility valuations was provided. QALYs are a validated benefit measure, which allow cross-disease comparisons.

Costs:
The analysis of costs appears to have been consistent with the study perspective, but the economic analysis was not presented in detail. The costs were presented as macro-categories related to health states and a breakdown of cost items.
was not provided. Details on the resource consumption were not given and the sources used were not described, which reduces the transparency of the economic analysis. The price year and the use of discounting were reported. Only variations in macro-categories of costs were tested in the sensitivity analysis. The cost estimates were treated deterministically.

Analysis and results:
The costs and benefits were appropriately synthesised. The issue of uncertainty focused on individual parameters in one-way sensitivity analyses. The use of a multi-way sensitivity analysis considering simultaneous changes in model inputs would have been more appropriate. The results of both the base-case and the sensitivity analyses were clearly presented and discussed. A simplified description of the decision model was provided. The authors stated that their findings were in line with those from previous studies. They pointed out some limitations to their analysis, especially the need for assumptions to be made for the long-term data.

Concluding remarks:
The study followed a validated methodology, although some sources of data were not described. The authors’ conclusions appear to be valid and strengthened by the extensive sensitivity analysis.

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