Cost effectiveness of denosumab compared with oral bisphosphonates in the treatment of post-menopausal osteoporotic women in Belgium

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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
The objective was to assess the cost-effectiveness of denosumab, compared with oral bisphosphonates, for the treatment of osteoporosis in postmenopausal women aged 60 years or older. The authors concluded that denosumab appeared to be cost-effective, for the treatment of osteoporosis, in Belgium. The methods appear to have been appropriate and the results were well reported. It was unclear how the data on the comparators were combined; despite this the authors’ conclusions appear to be appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of denosumab, compared with oral bisphosphonates, for the treatment of osteoporosis in postmenopausal women aged 60 years or older.

Interventions
Denosumab was compared with two oral bisphosphonates: alendronate (branded and generic) and risedronate (branded only). Two subgroups of women were analysed; those with a bone mineral density (BMD) T-score of -2.5 or less and those with prevalent vertebral fractures. For each subgroup, three age groups were analysed (60, 70, and 80 years).

Location/setting
Belgium/not reported.

Methods
Analytical approach:
A published and validated Markov model was updated to assess the cost-effectiveness of the interventions. The model combined data from published studies and had a six-month cycle length. A lifetime horizon was chosen and the authors reported that a health care payer perspective was adopted.

Effectiveness data:
The effectiveness data were from a variety of published sources. The probability of fracture, mortality, and drug adherence were from various studies. The treatment efficacy, which was the reduction in risk of fracture, was the key model input. For the intervention, these data were from the Fracture Reduction Evaluation of Denosumab in Osteoporosis every six Months (FREEDOM) trial, and for the comparators they were from a meta-analysis of randomised controlled trials (RCTs).

Monetary benefit and utility valuations:
The utility values, for the general population, were from a published systematic review. The fracture disutility values were from a Swedish study, which used the European Quality of life (EQ-5D) questionnaire to derive them.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure, and they were discounted at an annual rate of 1.5%.
Cost data:
The economic analysis included drugs, fractures, and monitoring costs. The drug estimates were from the Belgian Center for Pharmacotherapeutic Information. The fracture and monitoring estimates were from published studies. All costs were presented in 2009 Euros (EUR). They were discounted at an annual rate of 3%.

Analysis of uncertainty:
Monte Carlo simulation was used to examine the uncertainty in the model outputs. Cost-effectiveness acceptability curves were generated for various willingness-to-pay thresholds. One-way sensitivity analyses were carried out on the key model inputs.

Results
For women aged 70 years, with a BMD T-score of -2.5 or less, the cost per QALY gained with denosumab was EUR 14,120 compared with branded alendronate, and EUR 22,220 compared with generic alendronate. Denosumab dominated risedronate, as denosumab was less costly and more effective.

For women aged 70 years, with prevalent vertebral fractures, the cost per QALY gained with denosumab was EUR 14,166 compared with branded alendronate, EUR 19,718 compared with generic alendronate, and EUR 4,456 compared with risedronate.

The one-way sensitivity analyses showed that the results were most sensitive to changes in the fracture risk, patient adherence to treatment, and the discount rate. The likelihood of denosumab being cost-effective was 74.5% at a willingness-to-pay threshold of EUR 40,000 per QALY gained, for women with a T-score of -2.5 or less, and 89.0% for women with prevalent vertebral fractures.

Authors’ conclusions
The authors concluded that denosumab appeared to be cost-effective, compared with oral bisphosphonates, for the treatment of osteoporosis in postmenopausal women, in Belgium.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear; the authors reported that they were the most widely prescribed drugs for the treatment of osteoporosis, in the authors’ setting.

Effectiveness/benefits:
The efficacy of the treatments was from a RCT and a meta-analysis of RCTs, which should have been valid sources. Further data were appropriately obtained from Belgian sources, where possible. No systematic review appears to have been conducted to identify these sources, so it is uncertain if all the available evidence was included, but the sources appear to have been appropriate. The methods of the meta-analysis were not reported; so it is unclear if the data were appropriately combined and adjusted for an indirect comparison, with the data from the RCT. QALYs were an appropriate measure of benefit for capturing the impact of the interventions on quality and length of life, as well as allowing comparisons with other interventions.

Costs:
The authors reported that a health care payer perspective was adopted and the relevant costs appear to have been included. The sources for these costs were reported and appear to have been appropriate. The costs were presented as category totals rather than unit costs, reducing the transparency of the analysis. The time horizon, discount rate, and price year were all reported.

Analysis and results:
The data were synthesised using a Markov model, which was published elsewhere and validated. The details of the model, including a diagram, were provided. The results were described. The sensitivity analyses should have given a good indication of the impact of uncertainty on the results, as one-way and probabilistic sensitivity analyses were undertaken. The authors discussed some limitations to their analysis including the use of an indirect comparison between the intervention and the other drugs, given the lack of a head-to-head trial.
Concluding remarks:
The methods appear to have been appropriate and the results were well reported. It was unclear how the data on the comparators were combined; despite this the authors’ conclusions appear to be appropriate.

Funding
Supported by a grant from Amgen, manufacturer of denosumab.

Bibliographic details

PubMedID
21692551

DOI
10.2165/11539980-000000000-00000

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Aged, 80 and over; Antibodies, Monoclonal /economics /therapeutic use; Antibodies, Monoclonal, Humanized; Belgium; Bone Density Conservation Agents /economics /therapeutic use; Cost-Benefit Analysis; Denosumab; Diphosphonates /economics /therapeutic use; Female; Humans; Medication Adherence; Middle Aged; Models, Economic; Osteoporosis, Postmenopausal /drug therapy /economics; Quality-Adjusted Life Years

AccessionNumber
22011001716

Date bibliographic record published
08/02/2012

Date abstract record published
22/03/2012