Cost effectiveness and cost utility of risedronate for osteoporosis treatment and fracture prevention in women: a Swiss perspective  
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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 aim was to assess the cost-effectiveness of risedronate compared with no intervention, in postmenopausal osteoporotic women. Assuming a two-year residual effect, the incremental cost-utility ratio of risedronate was within the accepted thresholds from the age of 65 years and even cost saving over the age of 70 years with at least one risk factor. The methodology was good and both the methods and results were generally well reported. The authors' conclusions appear to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The aim was to assess the cost-effectiveness of risedronate compared with no intervention, in postmenopausal osteoporotic women with a bone mineral density T-score of -2.5 standard deviations or less. The analysis included different age groups and fracture risk factors, such as previous vertebral fracture, maternal history of hip fracture, and history of any fracture since the age of 50 years.

Interventions
Risedronate, at a dose of 35mg per week, with calcium and vitamin D, for five years, was compared with calcium and vitamin D alone, in postmenopausal osteoporotic women aged 70 years, who had a previous vertebral fracture.

Location/setting
Switzerland/primary care.

Methods
Analytical approach:
A published Markov model, with a one-year cycle length, was adapted to the Swiss setting, using local mortality, fracture incidence, and cost data from a variety of sources. The health states included healthy, healthy post-vertebral fracture, healthy post-hip fracture, healthy post-second hip fracture, vertebral fracture, hip fracture, second hip fracture, wrist fracture, and dead. A diagram of the model was provided. The time horizon of the analysis was seven years, with five years of treatment and two years of residual effect after treatment. The authors took a health care perspective.

Effectiveness data:
The effectiveness of risedronate versus no intervention was based on the results of large double-blind, randomised controlled studies. The residual effect post treatment was assumed to last for two years with a linear decline from 100% to 0%. The rate of premature discontinuation of risedronate therapy was incorporated.

Monetary benefit and utility valuations:
Population-based, age-specific general utility values were taken from the Swedish general population and published utility decrements, due to fracture, were applied. The instruments used to derive these utilities were not reported.

Measure of benefit:
The primary measures of benefit were quality-adjusted life-years (QALYs) and fractures averted. A discount rate of
3% per year was applied.

Cost data:
The cost categories included daily in-patient costs, drug costs, diagnostics, and other services. The unit costs were collected from official prices and tariffs for Switzerland. For example, the daily in-patient costs were obtained from the medical statistics database and the socio-medical institutions database of the Swiss Federal Statistical Office. The unit costs and resource use were reported in detail. The costs were measured in Swiss francs (CHF) and were converted into Euros (EUR) at the exchange rate of one EUR equals CHF 1.6. The price year was 2005 and a discount rate of 3% per year was applied.

Analysis of uncertainty:
Univariate sensitivity analysis was conducted on all parameters. The results for 120 scenarios were reported in a table. These included patients aged 60, 65, 70, 75, and 80 years; with, without, and a combination of the risk factors of previous vertebral fracture, maternal history of hip fracture, and history of any fracture since the age of 50; and with the residual effect post treatment lasting no years, two years, and five years. A scenario analysis was also conducted on the effectiveness for patients who prematurely discontinued risedronate therapy, the probability of a new nursing home admission after a hip fracture, and the discount rate.

Results
For the baseline cohort of 1,000 patients (aged 70, with one previous vertebral fracture, and a residual effect of two years), risedronate prevented 23 hip, 23 vertebral, and 2 wrist fractures. The QALYs per patient were 8.812 with risedronate, compared with 8.774 with no intervention. The total costs per patient were EUR 54,908 with risedronate therapy and EUR 55,626 with no intervention. Risedronate was dominant, which is less costly and more effective than no intervention.

Risedronate was dominant in 84 out of 120 scenarios and in another 27 scenarios risedronate treatment resulted in an incremental cost-utility ratio of less than EUR 45,000. Eight of the remaining nine scenarios with a incremental cost-utility ratio of more than EUR 45,000 were in women aged 60 years. The remaining scenario with a incremental cost-utility ratio of more than 45,000 euro was in women aged 65 years with no pre-existing risk factors and no assumed residual effects post-treatment.

Age at the start of therapy and the fracture risk profile had a significant impact on the results.

Authors' conclusions
The authors concluded that, assuming a two-year residual effect, the incremental cost-utility ratio of risedronate in women with postmenopausal osteoporosis was within the accepted thresholds from the age of 65 years and even cost saving above the age of 70 years with at least one risk factor. The decision to treat should be based on the patient's risk profile and not on the basis of bone density alone.

CRD commentary
Interventions:
The interventions were well described and relevant to the primary care setting, but another bisphosphonate, alendronate, was not included as a comparator.

Effectiveness/benefits:
The effectiveness of risedronate treatment was reported, but the methodology used to determine this effectiveness was not well reported and so the validity and generalisability cannot be assessed. The assumptions regarding the residual effects post treatment were well reported and explored in the analysis of uncertainty.

Costs:
The costs were relevant to the perspective. The unit costs and resource use were well reported and were derived from standard sources. The adjustments to the cost data were appropriate.
The use of a Markov model was appropriate for the disease and the methodology was well reported. The reporting of the results in terms of both cost-utility and cost per fracture avoided was appropriate and generalisable to other settings. The results and uncertainty analysis were well reported.

Concluding remarks:
The methodology was good and both the methods and results were well reported, although there was a lack of detail on how the effectiveness of risedronate was calculated. The authors' conclusions appear to be appropriate.

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