Cost-effectiveness of strontium ranelate versus risedronate in the treatment of postmenopausal osteoporotic women aged over 75 years
Hiligsmann M, Bruyere O, Reginster JY

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 assessed the cost-effectiveness of strontium ranelate, compared with risedronate, for the treatment of postmenopausal osteoporosis. The authors concluded that strontium ranelate was cost-effective, in Belgium, for the treatment of postmenopausal osteoporotic women aged over 75 years, but further research was required to confirm their findings. The methods and results were sufficiently reported and appear to have been comprehensive. The conclusions reached by the authors appear to be appropriate.

Type of economic evaluation
Cost-utility analysis

Study objective
The aim was to assess the cost-effectiveness of strontium ranelate for postmenopausal osteoporosis. Two hypothetical cohorts of Belgian women were modelled; one with osteoporosis, defined as a bone mineral density (BMD) T-score of -2.5 or less, and the other with prevalent vertebral fractures. Two patient ages, of 75 years and 80 years, were assessed for each cohort.

Interventions
Strontium ranelate was compared with bisphosphonate risedronate and no treatment. The drugs were taken orally, for three years, and treatment was assumed to be effective from the first dose.

Location/setting
Belgium/out-patient care.

Methods
Analytical approach:
The cost-effectiveness of strontium ranelate was estimated using a Markov micro-simulation model, which synthesised data from published sources, including randomised controlled trials and epidemiological studies. The model had been validated by the authors (Hiligsmann, et al. 2009, see ‘Other Publications of Related Interest’ below for bibliographic details). The time horizon was the patients’ lifetimes and the authors stated that the payer’s perspective was taken. This included the direct health care costs and patient’s out-of-pocket contributions.

Effectiveness data:
The baseline risk estimates were from a study of Belgian women (Hiligsmann, et al. 2008a, see ‘Other Publications of Related Interest’ below for bibliographic details). The BMDs that were used to diagnose osteoporosis were derived from the National Health and Nutrition Examination Surveys (NHANES) III database. Two systematic reviews provided the estimates for the effectiveness of the treatments on fracture risk. The main clinical effectiveness estimates were the relative risk reductions in osteoporotic fractures of the hip, clinical vertebrae, or wrist.

Monetary benefit and utility valuations:
The values for the bone fracture health states were from a previous study by the authors (Hiligsmann, et al. 2008b, see ‘Other Publications of Related Interest’ below for bibliographic details), which identified them using a systematic literature review.
Measure of benefit:
The measure of benefit was quality-adjusted life-years (QALYs) and discounting was applied at an annual rate of 1.5%.

Cost data:
The direct medical costs were those for drug therapy, fracture treatment (acute and long-term), physician care, and BMD measurement. The cost estimates were from a selection of published studies and the direct cost of a hip fracture was from Belgian studies. The costs were discounted at 3.5% per annum and reported in 2006 Euros (EUR).

Analysis of uncertainty:
The uncertainty was measured in one-way sensitivity analyses on the key parameters and the results were presented in tables. A probabilistic sensitivity analysis was undertaken and log normal distributions were assigned to the estimates of the treatment effect on fracture risk. There were 150 micro-simulations and the results were presented in cost-effectiveness acceptability curves (CEACs).

Results
For 75-year-olds, the incremental cost of strontium ranelate compared with no treatment was EUR 444.30 for women with osteoporosis and EUR 553.40 for women with prevalent vertebral fractures. Compared with risedronate, there was a cost saving of EUR 35.70 for women with osteoporosis and an incremental cost of EUR 49.20 for women with prevalent vertebral fractures. The incremental QALYs for strontium versus no treatment were 0.0285 for women with osteoporosis and 0.0335 for women with prevalent vertebral fractures. Compared with risedronate, the incremental QALYs were 0.0056 for women with osteoporosis and 0.0043 for women with prevalent vertebral fractures.

The incremental cost-utility ratios for strontium compared with no treatment were EUR 15,588 per QALY for women with osteoporosis and EUR 16,518 per QALY for women with prevalent vertebral fractures. Compared with risedronate, strontium was dominant as it was more effective and cheaper, for women with osteoporosis, while the incremental cost-utility ratio was EUR 11,435 per QALY for women with prevalent vertebral fractures.

For 80-year-olds, overall, lower costs, fewer QALYs and lower cost-utility ratios (or cost savings) were found with strontium.

These results were sensitive to variation in the key parameters, particularly when assuming adherence rates similar to those for bisphosphonate therapy. Based on the CEACs comparing strontium with risedronate, there was a 59% probability that the incremental cost per QALY gained would be under EUR 40,000 for 75-year-old women with osteoporosis and a 62% probability for those with prevalent vertebral fractures.

Authors' conclusions
The authors concluded that strontium ranelate was cost-effective in Belgium for the treatment of postmenopausal osteoporotic women aged over 75 years. Further research was recommended to assess the adherence to strontium ranelate in real-world settings and the relationship between compliance and fracture risk.

CRD commentary
Interventions:
The authors chose two widely available therapies for older women with osteoporosis and these interventions were described and appear to have been appropriate. There were no other direct comparison studies for these interventions and it is unclear if there were other relevant comparators that could have been included. It appears that the comparators reflected current practice and they might be appropriate for other settings.

Effectiveness/benefits:
The key treatment effect data were from Cochrane systematic reviews, which are likely to have provided high quality data. It is unclear whether a systematic review was undertaken to identify all the relevant evidence for other parameters, and so it is uncertain if the best available evidence was used. The measure of benefit appears to have been valid; to fully assess the methods and values, the authors' paper (see, Hiligsmann, et al. 2008b) should be consulted. The benefits were appropriately discounted.
Costs:
The direct medical costs were included and appear to have reflected the perspective, but full details of the resource types, how these were valued, and the unit costs were not given. These details should be available in the source publication (see, Hiligsmann, et al. 2009). The costs were appropriately discounted and adjusted for inflation.

Analysis and results:
The modelling was not clearly described and no diagram was given, but the key model inputs and the data sources were provided. The model details were available elsewhere. The authors reported a number of limitations to their study, including the lack of head-to-head trial data for strontium ranelate versus risedronate, the underlying differences in the baseline characteristics of the populations studied, and the assumptions for the long-term costs associated with fractures. They evaluated the impact of variations in the data in thorough sensitivity analyses and appear to have presented the results comprehensively.

Concluding remarks:
On the whole, the methods and results were sufficiently reported and appear to have been comprehensive. The conclusions reached by the authors appear to be appropriate.

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