Cost-utility of long-term strontium ranelate treatment for postmenopausal osteoporotic women

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
The objective was to assess the cost-effectiveness of long-term strontium ranelate, compared with no treatment, for postmenopausal osteoporotic women aged 70 years or older, either with a bone mineral density T-score of -2.5 standard deviations or less, or with prevalent vertebral fractures. The authors concluded that long-term strontium ranelate was cost-effective, compared with no treatment, for these women. The model was validated, reasonably well described, and adequate. The authors’ conclusions appear to be valid, within the scope of the analysis.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of long-term strontium ranelate, compared with no treatment, for postmenopausal osteoporotic women aged 70 years or older, either with a bone mineral density T-score of -2.5 standard deviations (SD) or less, or with prevalent vertebral fractures.

Interventions
The intervention was a 2g sachet of strontium ranelate once daily for five years.

Location/setting
Belgium/secondary care.

Methods
Analytical approach:
A validated Markov micro-simulation model (Hiligsmann, et al. 2009, see ‘Other Publications of Related Interest’ below for bibliographic details) was used to simulate the progressive nature of the condition and evaluate the impact of alternative fracture states on the outcomes. The time horizon was lifetime. The authors reported that the perspective of the Belgian health care system was adopted.

Effectiveness data:
All the model parameters were selected from Belgian literature, where available, or otherwise from systematic reviews. The hip fracture rates were from Belgian epidemiological studies, while the incidence of other fractures was estimated, using rates from other countries and assuming that the ratio between hip and other fractures was the same. Based on the literature, a gradual linear loss of fracture-reduction benefit from 100% to zero was assumed. This reduction began at the end of treatment and ended five years later. The main clinical parameter was the relative risk of fractures with or without treatment.

Monetary benefit and utility valuations:
The utility values for each of the health states were from a published systematic review of utility data for osteoporotic fracture (Hiligsmann, et al. 2008, see ‘Other Publications of Related Interest’ below for bibliographic details).

Measure of benefit:
The benefit measure was quality-adjusted life-years (QALYs), which were discounted at an annual rate of 1.5%.
Cost data:
The cost categories included the costs of fracture, drug therapy, physician visits, and bone mineral density measurement. The unit costs of drugs came from the Belgian Centre for Pharmacotherapeutic Information. The fracture costs, which included direct and long-term costs, were from Belgian studies. The price year was 2006. Future costs were discounted at an annual rate of 3% and all costs were reported in Euros (EUR).

Analysis of uncertainty:
A univariate analysis was performed to test the stability of the model results by varying the adherence to therapy, fracture costs, disutility, fracture risk, and discount rate. A probabilistic sensitivity analysis was conducted to assess the uncertainty. As this was a micro-simulation model, the univariate analyses were run with 200,000 trials, while the probabilistic analysis was run with 25,000 trials, due to the computational requirements.

Results
For women aged 70 years, with a T-score of -2.5 SD or less, the costs were EUR 12,267 for strontium ranelate and EUR 11,443 for no treatment. The QALYs were 10.3807 for strontium ranelate and 10.3261 for no treatment. For those with prevalent vertebral fractures, the costs were EUR 11,473 for strontium ranelate and EUR 10,201 for no treatment. The QALYs were 10.3068 for strontium ranelate and 10.2525 for no treatment.

For women aged 75 years, with a T-score of -2.5 SD or less, the costs were EUR 11,037 for strontium ranelate and EUR 11,354 for no treatment. The QALYs were 8.0563 for strontium ranelate and 8.0105 for no treatment. For those with prevalent vertebral fractures, the costs were EUR 10,841 for strontium ranelate and EUR 10,353 for no treatment. The QALYs were 8.0138 for strontium ranelate and 7.9635 for no treatment.

For women aged 80 years, with a T-score of -2.5 SD or less, the costs were EUR 9,912 for strontium ranelate and EUR 9,837 for no treatment. The QALYs were 5.9120 for strontium ranelate and 5.8893 for no treatment. For those with prevalent vertebral fractures the costs were EUR 10,062 for strontium ranelate and EUR 10,116 for no treatment. The QALYs were 5.8839 for strontium ranelate and 5.8498 for no treatment.

For women with a T-score of -2.5 SD or less, table two reported that strontium ranelate was cost-saving for women aged 80 years, but the data suggested that the incremental cost per QALY gained versus no treatment was EUR 3,303. For women aged 70 years the incremental cost per QALY gained was EUR 15,096. For women aged 75 years the incremental cost per QALY was presented as EUR 6,913, but strontium dominated no treatment as it cost less and produced more benefits.

For women with prevalent vertebral fractures, compared with no treatment, strontium ranelate was cost-saving at 80 years. The incremental cost-effectiveness ratio was EUR 23,426 for women aged 70 years and EUR 9,698 for women aged 75 years.

The sensitivity analysis showed that these results were sensitive to changes in the fracture risk and discount rates. Some other parameters had a modest impact.

Authors' conclusions
The authors concluded that long-term strontium ranelate was cost-effective, compared with no treatment, for postmenopausal osteoporotic women over 70 years old.

CRD commentary
Interventions:
The interventions were well described. Strontium ranelate had been shown in clinical studies to be more effective than no treatment, but it was not clear if all the relevant comparators were considered and no treatment might not have been the only alternative available to these patients.

Effectiveness/benefits:
The clinical data appear to have been from relevant published studies, including a systematic review, but the details of these studies were not reported, so a full assessment of their validity is not possible. The reporting was sufficient to
understand the assumptions underpinning the data and these assumptions were clearly tested in the analysis of uncertainty. The micro-simulation model allowed the data to be used in a manner that closely reflected clinical practice. The results were sensitive to the fracture risks and these parameters were clearly presented, allowing some judgement as to whether they were relevant. The measure of benefit was QALYs, which was appropriate, not only because they capture the impact of disease on a patient's quality of life, but also because they allow cross-disease comparisons to be made. The utilities were reported to have been from a systematic review, but the details of their derivation were not given.

Costs:
The costs were relevant to the perspective. Some of the unit costs and resource use were well reported, but others were not. The fracture costs were from published studies, but their methods were not described. This limited reporting reduces the transparency of the analysis, but the details might be available in other referenced reports. The basic details of the cost analysis, such as the price year and discounting, were reported. Variations in the costs were considered in the sensitivity analysis. The authors justified the exclusion of those costs associated with adverse events; the difference in the incidence of adverse events was not significant between comparators.

Analysis and results:
The modelling appears to have been comprehensive and the validation and assumptions underpinning the structure were available in another publication. The reporting was clear and concise, but lacked some of the finer details, which could have confirmed the quality of the analysis. There seem to have been some small errors in the reporting of the cost-utility results or the costs, but these did not alter the conclusions. The uncertainty was appropriately addressed in the sensitivity analysis, which included both deterministic and probabilistic analyses.

Concluding remarks:
The modelling approach was validated, reasonably well described, and adequate. The authors' conclusions appear to be valid, within the scope of the analysis.

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