Prevention and management of hyperphosphatemia with sevelamer in Canada: health and economic consequences
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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
This study compared the cost-effectiveness of using a sevelamer hydrochloride binder versus a calcium-based phosphate binder for the treatment of hyperphosphataemia in patients with end-stage renal disease, who were on haemodialysis. The authors concluded that sevelamer was a cost-effective intervention in the Canadian setting. There were limitations in the reporting that make it difficult to assess the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The aim was to compare two strategies for the management of hyperphosphataemia in patients with end-stage renal disease, who were on haemodialysis.

Interventions
The interventions were a calcium-based phosphate binder versus sevelamer hydrochloride (Renagel manufactured by Genzyme Corporation, Cambridge, Massachusetts, USA), a non-calcium phosphate binder.

Location/setting
Canada/secondary care.

Methods
Analytical approach:
The authors adapted a discrete event model (Huybrechts, et al. 2005, see ‘Other Publications of Related Interest’ below for bibliographic details) that had a 13-year time horizon and used a variety of data sources. They reported that the Canadian Medicare (third-party payer) perspective was adopted.

Effectiveness data:
The effectiveness data were derived from published studies. The risk of a cardiovascular event and the changes in cardiac calcification parameters were estimated, by the authors, using published regression equations and data from a longitudinal data set. The primary outcome was the likelihood of a fatal cardiovascular event and this was obtained from the longitudinal data set.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The summary measure of benefit was the number of life-years gained (LYG). Benefits were discounted at an annual rate of 3%.

Cost data:
The analysis included the direct medical costs of hospitalisation; pharmacy, laboratory, imaging, and radiology services; diagnostic and surgical procedures; and in-patient physician services. The costs were reported as summary categories and mean costs were obtained from the Ontario Case Costing Initiative. They were reported in Canadian dollars (CAD).
for the price year 2005. Future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
The uncertainty was investigated using one-way sensitivity analysis on the following model parameters: efficacy of sevelamer, effect of calcification on cardiovascular risk, treatment to lower cholesterol, treatment costs, event costs, time horizon, discount rate, patient's age, baseline calcium and phosphate levels, and duration of risk reduction. Multivariate sensitivity analysis was also conducted by varying simultaneously the treatment effect in the regression equations, by the 95% confidence interval, and the management cost for cardiovascular disease, by ±50%, and a cost-effectiveness acceptability curve was generated.

Results
For one year of treatment, in a population of 100 patients, the expected survival was 8.98 years with calcium carbonate and 9.22 years with sevelamer, which was a discounted gain of 0.1777 years.

When sevelamer was compared with calcium carbonate, the incremental cost-effectiveness ratio (ICER) was CAD 12,384 per LYG.

One-way sensitivity analysis demonstrated that the results were very sensitive to variation in the time horizon and efficacy. For one year of sevelamer to produce an ICER of less than CAD 25,000 per LYG, the cardiovascular risk reduction compared with calcium carbonate (treatment effect) had to last for at least 6.6 years.

Authors' conclusions
The authors concluded that sevelamer was a cost-effective intervention in the Canadian setting.

CRD commentary
Interventions:
The rationale for the choice of interventions was reported. They were limited to those interventions used in the study setting and there might be other relevant treatments in other settings.

Effectiveness/benefits:
No systematic review of the literature was reported and the regression equations were not reported. Limited details on the sources and the methods used to combine the primary data were provided, making it difficult to objectively assess the quality of the estimates used. LYG are a validated measure of benefit as they show the impact of the interventions on survival and they allow cross-disease comparisons to be made.

Costs:
The costs appear to have reflected the stated perspective. Resource use was based on average actual use, which was obtained from local sources, so these data were applicable to the setting. The resource data, in terms of length of stay, and the hospitalisation costs were reported, but only for total categories, which limits the transparency of the analysis. The price year and discounting were appropriately reported.

Analysis and results:
The model structure was presented, but not all of the data, such as the risk of events, were explicitly reported. An incremental analysis was performed, but the results were not fully reported. Uncertainty was investigated using univariate and multivariate sensitivity analyses, but the β coefficients and the 95% confidence intervals, over which the parameters were tested, were not reported. The authors noted potential limitations to their analysis, which mainly related to the low quality of the clinical and cost data and the lack of long-term clinical data.

Concluding remarks:
There were limitations in the reporting, which make it difficult to assess the authors' conclusions.

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