Cost-utility analysis of rimonabant in the treatment of obesity

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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 estimate the incremental cost-utility ratio of rimonabant plus lifestyle interventions compared with lifestyle interventions alone or no treatment for obesity. The authors concluded that rimonabant had the potential to decrease the rate of obesity-related co-morbidities and improve health-related quality of life, but at a considerable cost. The level of reporting was generally good. The authors provided a relatively transparent analysis, with an appropriate methodology and their conclusions appear to be appropriate.

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

Study objective
The aim was to estimate the incremental cost-utility ratio of rimonabant with lifestyle interventions compared with lifestyle interventions alone or no treatment for obese people, with a body mass index (BMI) of either over 30 or over 27, and with treated or untreated dyslipidaemia or hypertension.

Interventions
The five strategies were: rimonabant, at a dose of 20mg per day, with lifestyle interventions for one year; rimonabant with lifestyle interventions for one year followed by placebo with lifestyle interventions for one year; rimonabant with lifestyle intervention for two years; placebo with lifestyle interventions for two years; and no intervention. The lifestyle interventions included a 600kcal low-calorie diet, dietician visits every 14 days for the first month and every 28 days for the remainder of the study, and instructions to increase physical activity.

Location/setting
USA/primary care.

Methods
Analytical approach:
A decision tree with four possible outcomes (diabetes, coronary heart disease, both or none) for each strategy was used to synthesise the data from a variety of sources. A diagram of the decision tree was provided. The time horizon of the model was five years. The authors stated that a third-party payer perspective was taken.

Effectiveness data:
The efficacy data was obtained from three similar, randomised, double-blinded, placebo-controlled, parallel group, fixed-dose, multi-centre studies with a four-week single-blinded run-in period with placebo (Van Gaal, et al. 2005, Despres, et al. 2005, Pi-Sunyer, et al. 2006, see 'Other Publications of Related Interest' below for bibliographic details). The patients were randomised to placebo, or 5mg or 20mg of rimonabant, taken once a day, and they received lifestyle interventions. The results were reported after 12 months, and in one study after 12 months the patients were randomised again to either continue treatment or switch to placebo. A meta-analysis using a fixed effects model was then undertaken to pool the data on BMI, weight, and waist circumference. No evidence of heterogeneity was found. Observational data was used to model the relationship between BMI and the incidence of type 2 diabetes, and between waist circumference and the incidence of coronary heart disease (fatal and non-fatal myocardial infarction).

Monetary benefit and utility valuations:
The impact of a reduction in BMI on health-related quality of life was based on data from a clinical trial of orlistat. This
trial used a visual analogue scale, which was then transformed into a time trade-off estimate using the Torrance transformation (Hakim, et al. 2002, see 'Other Publications of Related Interest' below for bibliographic details).

Measure of benefit:
The measures of benefit were the incidence of type 2 diabetes and coronary heart disease, and quality-adjusted life-years (QALYs), which were discounted at an annual rate of 3%.

Cost data:
The costs categories included drug costs, direct medical costs of dietician visits and physician visits, cost of a myocardial infarction, and cost of diabetes. Drug costs were based on the average wholesale price of orlistat and sibutramine, reduced by 15% to reflect patients’ contributions. The unit costs of dietician visits were obtained from the Medical Assistance Administration in the state of Washington, and those of physician visits were obtained from Medicare. All costs were converted to 2006 US dollars ($) using the medical care component of the Consumer Price Index, and were discounted at an annual rate of 3%.

Analysis of uncertainty:
The uncertainty was explored using one-way sensitivity analysis and probabilistic sensitivity analysis. The results were presented in a table; on the cost-effectiveness plane, as cost-effectiveness acceptability curves; and as a tornado diagram.

Results
The strategies of rimonabant plus lifestyle interventions for one year and rimonabant plus lifestyle interventions for one year followed by placebo plus lifestyle interventions for one year resulted in higher costs and lower efficacy than a combination of the other strategies (placebo plus lifestyle interventions, rimonabant plus lifestyle interventions for two years, and no treatment), which means they were extendedly dominated.

The incidence of coronary heart disease with no treatment was 1.16%, which was reduced by 0.042% with placebo and by 0.083% with rimonabant for two years. The incidence of diabetes with no treatment was 5.06%, which was reduced by 0.192% with placebo and by 0.470% with rimonabant for two years.

The total costs per patient for each non-dominated strategy were: $6,060.27 with rimonabant for two years, $1,878.61 with placebo, and $851.41 with no treatment. The total QALYs gained per patient for each strategy were 0.0984 with rimonabant for two years over placebo was $71,973.43 and over no treatment it was $52,935.52.

Rimonabant for two years was cost-effective in 40.2% of the simulations compared with no treatment and 1.6% of the simulations compared with placebo, at a willingness to pay of $50,000 per QALY. One-way sensitivity analysis indicated that the critical variables that had an impact on the incremental cost-utility ratio were the daily drug cost, change in BMI, sustainability of weight loss, and the utility transformation factor between the visual analogue scale and the time trade-off estimate.

Authors' conclusions
The authors concluded that rimonabant combined with lifestyle interventions had the potential to decrease the rate of obesity-related co-morbidities and improve health-related quality of life, but at a considerable cost.

CRD commentary
Interventions:
The strategies were well described and appropriately compared with lifestyle interventions alone or no intervention. Other available treatments for obesity, such as sibutramine and orlistat, were mentioned, but were not included in the analysis.

Effectiveness/benefits:
No systematic review of the literature was reported, so it is unclear whether the best available evidence was used to determine the effectiveness estimates. The methodology of the clinical trials and the pooling of data appear to have
been robust. The level of reporting of the assumptions was appropriate. The methods used to estimate the utilities for weight loss were reported and appear to have been acceptable. The authors noted one limitation that the utilities associated with type 2 diabetes and coronary heart disease were not considered. QALYs and the incidences of type 2 diabetes and coronary heart disease were appropriate benefit measures, given the impact of the disease on both the quality of life and the incidence of co-morbidities. The authors also noted the limitation that other obesity-related co-morbidities were not considered.

Costs:
It appears that all the costs relevant to the perspective and study question were included. A breakdown of the unit costs, the resource use, and their sources were provided. The drug costs were based on those of alternative drugs available for the treatment of obesity and so should be considered with caution. The details of the price year and pricing adjustments were provided and were appropriate.

Analysis and results:
Overall the analytical approach was satisfactorily reported and the model structure was reported in full with a diagram. The time horizon was appropriate given the strategies considered. The use of an incremental analysis was appropriate to determine the most reasonable economic strategy. The impact of uncertainty was appropriately explored through one-way and probabilistic sensitivity analysis. Overall, the results of the base case and sensitivity analyses were satisfactorily reported and extensively discussed. The authors also pointed out some possible limitations of their model.

Concluding remarks:
The level of reporting was generally good. The authors provided a relatively transparent analysis, with an appropriate methodology and their conclusions appear to be appropriate.

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Other publications of related interest


Pi-Sunyer FZ, Aronne LJ, Heshmati HM, et al. Effect of rimonabant, a cannabinoid-1 receptor blocker, on weight and cardio-metabolic risk factors in overweight or obese patients: RIO-North America: a randomized controlled trial. JAMA 2006;295:761-75.

Indexing Status
Subject indexing assigned by NLM

MeSH
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