Cost-effectiveness of a low-calorie diet and orlistat for obese persons: modeling long-term health gains through prevention of obesity-related chronic diseases
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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 examined the cost-effectiveness of a low-calorie diet alone or combined with treatment with orlistat, for the management of obesity in primary care, compared with no intervention. The authors concluded that a low-calorie diet was the preferred option for policymakers. The study was hindered by limited reporting, but the use of national sources for costs and the use of a well-validated model, improve the reliability of the results. Despite some limitations, the authors' conclusions are likely to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
This study compared the cost-effectiveness of two interventions for the management of obesity in the Dutch population, aged between 20 and 70 years, with a body mass index (BMI) of 30 or more.

Interventions
The interventions were one-year pharmacological treatment with orlistat (three times daily) in combination with a low-calorie diet or a low-calorie diet alone and these were compared with no intervention.

Location/setting
Netherlands/primary care.

Methods
Analytical approach:
A well-validated Markov model, the Rijksinstituut voor Volksgezondheid en Milieu (RIVM) Chronic Disease Model, was used to estimate the life-long health benefits and costs of the interventions in the Dutch context. The time horizon was 80 years and the authors stated that the perspective of the health care system was adopted.

Effectiveness data:
The clinical estimates were derived from a variety of sources. The effectiveness of the interventions on weight loss was from a published meta-analysis. The incidence of, prevalence of, and mortality due to disease at different levels of BMI were derived from general practice registrations, national registries, and population surveys. The relative risks of morbidity and mortality by BMI were from observational studies. The details of the methods and the data used were reported in a separate study (van Baal, et al. 2006, see 'Other Publications of Related Interest' below for bibliographic details) The main clinical outcomes were the proportion of individuals moving from obese to overweight due to the interventions and the average differences in diabetes and osteoarthritis prevalence due to the interventions.

Monetary benefit and utility valuations:
Disability weights for specific disease prevalences were obtained from the Dutch Burden of Disease Study. The RIVM Chronic Disease Model was used to estimate the BMI-related disease prevalence over time.

Measure of benefit:
Quality-adjusted life-years (QALYs) and life-years gained (LYG) were the measures of benefit. They were discounted at an annual rate of 1.5%.
Cost data:
The analysis included the costs of the interventions, which included drug costs, general practitioner time, dietician time, and food diary costs. These costs were calculated using a bottom-up approach. They also included the cost-savings associated with the reduction in future obesity-related disease and obesity-unrelated disease occurring during life years gained due to the interventions. These costs were from Dutch Cost-of-illness data for the year 2003. All costs were reported in Euros (EUR) for the price year 2005. Future costs were discounted at an annual rate of 4%.

Analysis of uncertainty:
Parameter uncertainty was investigated using probabilistic sensitivity analysis and a cost-effectiveness acceptability curve was generated. One-way deterministic analysis was also conducted to assess the following model assumptions: quality of life dependent only on the BMI instead of the disease; 50% and 100% weight loss maintenance in both strategies, in the long term (23% in the base case); 50% weight loss maintenance only in the orlistat strategy; age of the target population between 30 and 35 years; the exclusion of costs of disease not related to obesity; and the inclusion of only intervention-related costs.

Results
The total discounted QALYs gained for a target population of 1,138,000 individuals were 17,000 for low-calorie diet alone and 31,000 for orlistat plus low-calorie diet. The total discounted LYG were 18,000 for diet alone and 34,000 for orlistat plus diet.

An incremental analysis was performed. When diet alone was compared with no treatment it resulted in an incremental discounted cost of EUR 302,000,000 and when orlistat plus diet was compared with diet alone it resulted in an incremental cost of EUR 1,136,000,000.

When diet was compared with no treatment it resulted in an incremental cost-effectiveness ratio of EUR 17,900 per QALY gained, and when orlistat plus diet was compared with diet alone it resulted in a ratio of EUR 58,800 per QALY gained.

The cost-effectiveness acceptability curve suggested that at a willingness-to-pay of between EUR 18,000 and EUR 58,000 for a QALY, diet alone was the most cost-effective strategy, but at higher values orlistat plus diet was the most cost-effective strategy. The deterministic sensitivity analysis demonstrated that the results were sensitive to most of the assumptions tested, but least so to the age of the target population.

Authors' conclusions
The authors concluded that a low-calorie diet was the preferred option for the management of obesity.

CRD commentary
Interventions:
The rationale for the selection of the comparator was clear in that no intervention was the commonly used approach in primary care in the authors' setting. The two interventions were only partly described, which may hinder the generalisability.

Effectiveness/benefits:
The authors did not report a systematic literature review and the primary sources of effectiveness data might have been selected, rather than the best available. Key estimates were based on a meta-analysis, which should have the highest level of internal validity. The sources of the other data were not explicitly described, but may have been reported in another publication. Similarly, there was little information on the derivation of the utility weights used to calculate the QALYs. The two benefits measures, LYG and QALYs, were appropriate as both allow cross-disease comparisons. The lack of transparency in the selection of data sources makes it impossible to assess whether the best available evidence was used.

Costs:
The perspective was reported and it would appear that all the costs relevant to this perspective were considered. With the exception of the intervention-related costs, the costs were not reported in any detail. They were derived from a
national study and are likely to have reflected the local accounting system, but it is difficult to judge their validity and the limited reporting would hinder the reproduction of the analysis. The discount rates were standard for the Netherlands, but did not reflect the current guidance in the UK.

Analysis and results:
Full details of the model were not presented, but were available from other sources. There were some limitations in the reporting of data inputs and the cost results could have been presented in more detail; only incremental costs were reported. The issue of uncertainty was appropriately addressed by means of deterministic as well as probabilistic sensitivity analysis. An appropriate incremental analysis was conducted and the results were well presented and discussed. The authors acknowledged that their assumptions had a strong influence on the results, but the sensitivity analysis suggested that they did not affect the rank of the cost-effectiveness of the two interventions. The authors discussed their findings in detail and they compared their results with those of other published studies, highlighting the differences in the methods.

Concluding remarks:
The study was hindered by limited reporting, but the use of national sources for costs and the use of a well-validated model make the analysis more robust. Despite some limitations, the authors’ conclusions are likely to be valid.

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