Cost-effectiveness of bariatric surgery: should it be universally available?
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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 examine the cost-effectiveness of bariatric surgery to treat obesity in a nationally representative sample of people with a body mass index (BMI) of 35 or more, with or without obesity-related diseases. The authors concluded that bariatric surgery was generally cost-effective for obese people, especially for those with severe obesity and at least one obesity-related disease. The methods were valid and this should ensure that the authors’ conclusions are robust.

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

Study objective
The objective was to examine the cost-effectiveness of bariatric surgery to reduce obesity in a nationally representative sample of people with a body mass index (BMI) of 35 or more, with or without obesity-related diseases.

Interventions
Bariatric surgery was compared against no surgery.

Location/setting
USA/hospital.

Methods
Analytical approach:
The study was based on a decision-tree model, with a lifetime horizon. The authors did not explicitly state the perspective adopted.

Effectiveness data:
The effectiveness data were from a meta-analysis of randomised or non-randomised studies. A broad search of the literature in English was performed in the PubMed database to identify studies published between 2003 and 2010. These years were chosen to update previous meta-analyses. The meta-analysis was based on simple pooling of weighted means across studies, using a fixed-effect or random-effects model. The number of studies identified for most of the model parameters and the patients’ characteristics were reported. Most of the studies were conducted in the USA or Europe. The BMI change and remission of obesity-related diseases (coronary heart disease, hypertension, type 2 diabetes mellitus, dyslipidaemia, and stroke) were the key inputs for the model.

Monetary benefit and utility valuations:
Quality of life estimates were derived from published Bariatric Quality of Life (BQL) scores.

Measure of benefit:
Life-years and quality-adjusted life-years (QALYs) were the summary benefit measures.

Cost data:
The economic analysis included the costs of surgery (including complications and follow-up), the annual costs of obesity (depending on patient age and BMI), and the costs for patients without obesity-related diseases. The costs were from published studies, which provided a wide variation in estimates and the average costs were calculated for each category. All costs were in US dollars ($) and the price year was 2010. A 3% annual discount rate was applied.
Analysis of uncertainty:
One-way sensitivity analyses were carried out on the model inputs, using published ranges of values or alternative estimates. A bootstrapping approach was used to generate confidence intervals around the costs and benefits.

Results
BMI between 35 and 40: In patients with obesity-related diseases, the expected costs were $83,964 with surgery and $52,044 without. The life-years were 37.86 with surgery and 32.47 without. The QALYs were 30.64 with surgery and 17.33 without. With surgery over no surgery, the incremental cost per life-year gained was $6,468 and per QALY gained was $2,413. These ratios rose to $13,249 per life-year and $3,872 per QALY for patients without obesity-related diseases.

BMI between 40 and 50: In patients with obesity-related diseases, with surgery over no surgery, the incremental cost per life-year gained was $4,832 and per QALY gained was $1,853. In patients without obesity-related diseases these ratios rose to $27,876 per life-year and $3,770 per QALY gained.

BMI over 50: In patients with obesity-related diseases the expected costs were $90,950 with surgery and $89,379 without, the life-years were 38.39 with surgery and 32.30 without, and the QALYs were 29.21 with surgery and 17.21 without. Surgery dominated no surgery as it was more effective and less expensive. In patients without obesity-related diseases, the costs were $84,060 with surgery and $55,745 without. Surgery was dominant with life-years as the benefit measure and the incremental cost per QALY gained was $1,904.

The sensitivity analyses confirmed that the base-case findings were robust. The use of more recent cost data favoured surgery.

Authors' conclusions
The authors concluded that bariatric surgery was generally cost-effective for obese people, especially for those who were severely obese and had at least one obesity-related disease.

CRD commentary
Interventions:
The selection of the comparators was appropriate and the authors considered various surgical approaches as a single procedure by calculating the mean estimates for benefits and costs.

Effectiveness/benefits:
The selection of the clinical data was satisfactory. The meta-analysis of published evidence was a key objective of the study and extensive details of the methods were reported, such as the search process, screening for eligibility, extraction of data, and the meta-analytic approach. Many studies were identified and synthesised. The national representativeness of the sample was ensured, using epidemiological data from the National Health and Nutrition Examination Survey (NHANES) III. QALYs and life-years were appropriate benefit measures, as both capture the impact of the disease on a patient’s health. More information on the derivation of the utility values would have been helpful in assessing the validity of these data.

Costs:
The perspective was not explicitly stated by the authors, but the cost categories suggest that a third-party payer perspective was taken. Most of the costs were from published studies and their details were not given. The unit costs and resource quantities were not presented separately, reducing the transparency of the analysis. The authors stated that high variability was found in some cost items, such as the cost of surgery, and sensitivity analysis was conducted on the key cost inputs. The price year and discount rate were appropriately reported.

Analysis and results:
The results were clearly presented for each subgroup of patients. Incremental cost-effectiveness and cost-utility ratios were appropriately used to synthesise the costs and benefits of the two approaches. The authors stated that surgery was dominant for those with a BMI over 50, but the costs were actually higher with surgery than without surgery; treatment was still cost-effective. The uncertainty was investigated, using a deterministic approach and bootstrapping.
but the findings were selectively reported. It was unclear whether discounting was applied to health benefits and it was required, given the lifetime horizon of the analysis. The authors acknowledged some limitations to their model, such as the binary obesity-related disease status (present or not; no inclusion of severity) and the probabilities did not vary over time. The benefit results appear to be transferable to other settings, given the large number of studies selected from several countries, while the cost results will be transferable to settings with a similar cost structure.

Concluding remarks:
The methods were valid and this should ensure that the authors’ conclusions are robust.

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