Economic evaluation of weight loss interventions in overweight and obese women
Roux L, Kuntz K M, Donaldson C, Goldie S J

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.

Health technology
The study evaluated four weight loss strategies: diet only; diet and pharmacotherapy; diet and exercise; and a combination of diet, exercise and behaviour modification. All interventions were implemented for a 6-month period followed by a 6-month maintenance programme. Exercise consisted of three 45-minute sessions per week of moderate intensity exercise conducted by a certified instructor, and two monthly review sessions conducted by an exercise therapist. Pharmacotherapy comprised 120 mg of a lipase inhibitor (Orlistat, Hoffman-La Roche Ltd.) administered three times a day during the 6-month intervention, and half of this daily dose during the 6-month maintenance phase. Behaviour modification consisted of a 1-hour cognitive therapy counselling session with a psychologist every fortnight. Routine care was used as the comparator.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis, cost-utility analysis

Study population
The target population comprised a hypothetical cohort of 10,000 healthy obese and overweight women who were not pregnant and who were aged 35 years.

Setting
The setting was outpatient care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness data used to populate the model came from studies published between 1985 and 2001. The dates to which the resource use data referred were not reported. The price year was 2001.

Modelling
A first-order Monte Carlo model with a lifetime horizon was used to model the natural history of obesity in the cohort. This was characterised as a sequence of annual transitions from one health state to another. The health states were fully described, along with a number of modelling assumptions which were fully justified.

Study designs and other criteria for inclusion in the review
The clinical parameters associated with the programmes included changes in body mass index (BMI) in compliant women, the probability of programme compliance, the probabilities of 10% weight loss at 6 months and of weight loss maintenance at 1 and 5 years, and mortality rates.

Sources searched to identify primary studies
The clinical effectiveness data were derived from a number of large randomised controlled trials (RCTs). Given the lack of published literature about the maintenance of long-term weight loss, these were based on authors’ assumptions.

Methods used to derive estimates of effectiveness
A comprehensive review of published literature was undertaken to identify relevant studies. Although the methods of the review were not described, the inclusion and exclusion criteria applied were reported in full. The principal author of
the study and a research assistant independently reviewed the 75 RCTs identified.

**Measure of benefits used in the economic analysis**
The measures of benefit used were the quality-adjusted life-years (QALYs) and average life expectancy. Quality-of-life weights were derived from published literature augmented by primary data collected by the authors, based on a community sample of 100 females who participated in a medical weight management programme in an urban setting in Canada. The valuation method was not reported. The health benefits were appropriately discounted at an annual rate of 3%.

**Direct costs**
The direct costs included in the analysis were direct medical programme costs (health care provider services, laboratory and diagnostic tests, medications), direct obesity-related morbidity and mortality costs (treatment of hypertension, diabetes, and cardiovascular disease), and direct non-medical costs (fitness attire, travel costs, diet related). The resource use associated with each weight-loss intervention was determined using a micro costing methodology. Direct non-medical costs were estimated based on primary self-reported cost and quantity data derived from a community sample of 100 females who participated in a medical weight management programme in an urban setting in Canada. The source of the unit costs was reported, however, their values were not reported separately from the quantities used. The costs were reported as the average cost per patient. As with the health benefits, the costs were discounted at an annual rate of 3%. The price year was 2001.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
As the perspective adopted was societal, productivity costs were appropriately included. Time cost was estimated directly from the sample of 100 women mentioned above by applying wage rates specific to their occupation. The analysis was repeated using 2001 US national level data: time lost from work or leisure activity was valued using the US national average wage rate. Time loss from performing household duties was valued using wage rates for domestic childcare and light duty cleaning services. The costs and the quantities were not reported separately. The costs were discounted at an annual rate of 3% and were reported for the price year 2001.

**Currency**
US dollars ($).

**Sensitivity analysis**
Parameter uncertainty was investigating using various one-way sensitivity analyses on all uncertain parameters. The ranges over which parameters were tested were explicitly reported, and were mainly derived from the published literature. Particular emphasis was given to the investigation of uncertainty of those parameters at the front end of the model and to those for which the values were based on primary data collection.

**Estimated benefits used in the economic analysis**
The most effective and efficient strategy was the combination of diet, exercise and behaviour modification. This strategy dominated the remaining strategies. The health benefits were reported to be as follows:

- life expectancy (undiscounted/discounted), 43.874/24.170;
- QALYs (undiscounted/discounted), 32.655/18.426.

The results for the non-dominated strategies were reported in the paper.

**Cost results**
The total costs for the dominant strategy were $124.20.

**Synthesis of costs and benefits**
The costs and benefits were combined using an incremental cost-effectiveness ratio (i.e. the additional cost per life-year saved) and an incremental cost-utility ratio (i.e. the additional cost per QALY gained).

The combination of diet, exercise and behaviour modification was the dominant strategy. It resulted in an incremental cost of $12,640 per additional QALY gained and an additional cost of $60,390 per years of life saved, when compared with routine care alone.

The sensitivity analyses demonstrated that the results were most sensitive to variation in the obesity-related effects on quality of life and the probability of long-term weight loss maintenance. The results of the sensitivity analyses were explicitly reported.

**Authors’ conclusions**
The authors concluded that a multidisciplinary weight loss programme consisting of diet, exercise and behaviour modification for overweight and obese women may be cost-effective.

**CRD COMMENTARY - Selection of comparators**
No justification was provided for the comparator used, although this was defined as routine care (which may represent current practice). However, this is difficult to ascertain since routine care was not described. You should decide if this represents a valid comparator in your own setting.

**Validity of estimate of measure of effectiveness**
The parameters of the model were mainly derived from published literature. Although the authors reported that a “comprehensive” review of the literature was undertaken, there was no reference to or description of the search methods used. Preference was given to RCTs, which have a good level of internal validity. For those parameters not derived from published research, authors’ assumptions were used.

**Validity of estimate of measure of benefit**
The estimation of health benefits (life-year and QALYs) were derived appropriately from the model. The use of QALYs ensures the comparability of the results with the benefits of other health care interventions. The methods used to estimate utility weights were described in full. The benefits were appropriately discounted.

**Validity of estimate of costs**
The relevant cost categories appear to have been appropriate to the societal perspective adopted. However, as the authors reported aggregate costs, it is not possible to ascertain whether all relevant costs were included in each category. The costs and the quantities were not reported separately. These factors may limit the generalisability of the costing. The costs were appropriately discounted and the price year was reported, which facilitates future reflation exercises. Patients’ costs were based on primary self-reported data. However, appropriate statistical analysis was not undertaken to account for potential confounding factors. The authors acknowledged that the use of a small sample of women in a single urban setting as the source of certain cost data may impose some limits on the generalisability of their findings. Sensitivity analyses of the costs were conducted in order to assess the robustness of the estimates used.

**Other issues**
The authors did not compare their findings with those from other studies as they reported that, to their knowledge, this was the first study to examine the long-term relative value of conservative weight-loss management approaches, using an evidence-based comparative analytical framework. The results do not appear to have been presented selectively and the authors’ conclusions reflected the scope of their analysis. The authors reported a number of limitations to their study. For example, the extrapolation of long-term maintenance of weight loss based on authors’ assumptions, owing to a lack of accurate published data; and the choice of a cohort of healthy 35 year old woman may have led to the underestimation of the value of weight reduction interventions since these may also benefit younger and/or unhealthy woman.

**Implications of the study**
Although the authors did not make explicit recommendations for changes in policy or practice, they did recommend that future research should aim to confirm the impacts of these combined programmes on quality of life and the
likelihood of long-term weight loss maintenance. Furthermore, investments that improve the likelihood of long-term maintenance, even if costly, may provide a good return in terms of health gain for population for resources invested.

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