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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 study assessed the cost-utility of routine breast-reduction surgery in patients with symptomatic macromastia in a large university hospital in Finland. The authors concluded that breast-reduction surgery led to statistically significant improvement in health-related quality of life at a reasonable cost per QALY. The study was generally well reported, but some of the assumptions were not adequately described or justified, there was insufficient sensitivity analyses conducted. The results should be interpreted with caution.

Type of economic evaluation
Cost-utility analysis

Study objective
The study assessed the costs and utility of routine breast-reduction surgery in patients with symptomatic macromastia in a large university hospital in Finland.

Interventions
Patients were compared before and after they received breast-reduction surgery. This made the comparator breast surgery versus no surgery. Breast-reduction surgery was conducted by common techniques including the inferior pedicle (53%), Lejour (15%), and Stromback (13%) techniques.

Location/setting
Finland/inpatient and outpatient.

Methods
Analytical approach:
The analysis was based on data collected alongside a before-and-after trial of 80 breast-reduction surgery patients. The authors indicated that the study was conducted from the secondary treatment provider perspective. Follow-up was six months, but utility gains were extended to lifetime.

Effectiveness data:
The effectiveness data came from 80 patients within an ongoing prospective trial. The primary effectiveness data was health-related quality of life, which was collected using patient surveys at baseline and at six months after surgery. Utility gains were expected to continue for the remaining life expectancy of each patient with no degradation due to aging.

Monetary benefit and utility valuations:
Utility valuations were from the patients and the 15D generic preference-based quality of life instrument. The 15D instrument consisted of 15 dimensions: moving, seeing, hearing, breathing, sleeping, eating, speech, eliminating, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity. The maximum score of 15D utility was 1, which represented full health; the lowest score was 0, equivalent to death.

Measure of benefit:
The summary measure of benefit was quality-adjusted life-years (QALYs). Benefits were discounted in sensitivity analyses.

Cost data:
The direct hospital costs included the intervention, hospital stay, and follow-up outpatient appointments. Costs came from the Finnish Ecomed clinical patient administration system. Costs for the intervention were accumulated in a short time period. Prices were given in Euros (EUR).

Analysis of uncertainty:
Different discounting assumptions were tested. One way sensitivity analyses were conducted, where the upper and lower limits of 95% confidence intervals for costs and benefits were used as alternative values.

**Results**
The dimensions of 15D instrument with the most significant improvement after breast-reduction surgery were discomfort and symptoms, while breathing, sleeping and distress also showed statistically significant improvements. Deterioration in quality of life was found in 25% of patients, although the deterioration was not statistically significantly different. At baseline, patients had a utility score of 0.916; at six months this had improved to 0.939, which was statistically significant (p > 0.001). When utility gains were extrapolated to Finnish life expectancy, patients undergoing breast-reduction surgery gained 0.930 QALYs compared with no intervention.

Patients with a body mass index (BMI) below 25 had better statistically significant 15D instrument scores (median 0.9764), although patients with a higher body mass index still had improvements. The 15D median score in the body mass index range from 25 to 30 was 0.9395; above a body mass index of 30, the median score was 0.9361.

Total cost of breast-reduction surgery was EUR 3,383. The incremental cost-effectiveness ratio (ICER) for breast reduction compared with no breast reduction was EUR 3,638 per QALY with no discounting. If discounting was applied to QALY gains at a rate of 5%, the ICER increased to EUR 8,973 per QALY.

One way sensitivity analyses did not significantly alter the results.

**Authors' conclusions**
The authors concluded that breast-reduction surgery led to statistically significant improvement in health-related quality of life at a reasonable cost per QALY.

**CRD commentary**

**Interventions:**
The interventions were appropriate for the context of the analysis and were well reported. The surgical methods used were described along with proportions of patients who received the different types of surgeries, which allowed the surgical interventions to be compared with local practice.

**Effectiveness/benefits:**
The effectiveness data were well reported including means, standard deviations and statistical significance tests where differences between results were measured. It was not clear how long the patients were assumed gain benefit as this was not reported. The study used in the analysis was not randomised, so there was significant risk of bias due to study design, and details of patient selection methods were not reported.

The authors acknowledged that the assumption of constant utility over time may not have been justified, as patient utility decreased with age. It was not clear that patient utility would decrease at the same rate for patients with macromastia as those without for breast reduction surgery, so additional analyses of the effects of macromastia over time may have been warranted. The short duration of follow-up may not have captured all the benefits of breast-reduction surgery.

The QALYs were estimated using the 15D instrument, so these QALYs may not be comparable to QALYs estimated using the EQ-5D instrument; this may reduce the comparability of the results with other studies.

It was not clear how discounting was applied to QALYs in the sensitivity analyses, as life expectancy was not reported and it appeared that each patient was calculated individually. Given that discounting would be generally considered methodologically appropriate, discounted results should be applied appropriately for other settings.
Costs:
Costs came from appropriate sources, but were only reported as total costs. It was not clear whether the cost figures used would be applicable to another setting as it was not clear what had been charged precisely. Costs for no intervention were assumed to be zero, which could have underestimated the costs of symptomatic macromastia. No discounting of costs was reported, as costs for the intervention were accumulated in a short time period.

Analysis and results:
The sensitivity analysis undertaken was adequately described. However, a probabilistic sensitivity analysis would have given a better idea of the effect of the uncertainty of this parameter on the likelihood of cost-effectiveness for breast-reduction surgery. The results of the study were clearly reported and appear valid. It should be noted that the 95% confidence intervals for the utility scores for before and after surgery overlapped; this would indicate that there may be significant uncertainty in the effectiveness of surgery.

The authors compared their results to those of a UK economic evaluation based on Swedish efficacy data and UK costs, and found that their results were similar (Taylor et al. 2004, see ‘Other publications of related interest’). Efficacy was also compared with other studies; the results were generally in agreement between studies, which indicated that the external validity of the results may be strong. However, studies were generally small, which limited the strength of the findings.

Concluding remarks:
The study was generally well reported. However, some of the assumptions were not adequately described or justified; the sensitivity analyses conducted could have underestimated the uncertainty in the analysis; and there was a small sample size in the clinical trial. The results should be interpreted with caution and larger studies or reviews of effectiveness should be undertaken.

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