An economic evaluation of laparoscopic ovarian diathermy versus gonadotrophin therapy for women with clomiphene citrate resistant polycystic ovary syndrome

Farquhar C M, Williamson K, Brown P M, Garland 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
Laparoscopic ovarian diathermy (LOD) was compared with ovulation induction (OI) therapy using gonadotrophin.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised women aged 20 to 38 years with a body mass index of less than 35 kg/m2, who failed to ovulate with 150 mg of clomiphene citrate for 5 days in the early follicular phase and had more than 12 months of infertility. Women with other known causes of infertility were excluded.

Setting
The setting was secondary care. The economic study was carried out in New Zealand.

Dates to which data relate
The effectiveness data were derived from a study undertaken during 1996 to 1999. The costs were expressed in 1998 prices.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costs and outcome information were collected from the same group of patients as that used in the effectiveness analysis.

Study sample
Power calculations were not reported. The sample was recruited from women attending both publicly and privately funded fertility clinics. Twenty-nine women were recruited to the LOD intervention and 21 to gonadotrophin OI, two of the latter withdrawing prior to treatment.

Study design
The economic evaluation was based on an unblinded, pragmatic, patient-randomised controlled trial. The trial was undertaken at a single centre and reported in a separate paper (Farquhar et al. 2002, see 'Other Publications of Related Interest' below for bibliographic details).

**Analysis of effectiveness**
The analysis of the clinical study, which was reported in detail elsewhere, was conducted on an intention to treat basis. Pregnancies and live births were used as the outcome measures. The comparability of the groups at baseline was not reported, nor was any adjustment for confounding.

**Effectiveness results**
Seven of the 21 women in the OI group conceived, three of whom miscarried.

Eight of the 29 women in the LOD group became pregnant, none of whom miscarried.

**Clinical conclusions**
The authors simply reported that the pregnancy rates were similar.

**Measure of benefits used in the economic analysis**
Both the number of pregnancies and the number of live births were used as outcome measures. These were derived directly from the clinical study.

**Direct costs**
No long-term costs were reported, hence discounting was not required. Resource use was collected from patients enrolled in the randomised controlled trial for a number of cost categories. More specifically, drug therapy, luteal support, ultrasound, the pre-admission clinic, fixed theatre costs, fixed anaesthetic costs, theatre time, time on the ward, clinic visits (including tests), patient travel costs, patient expenditure on medicines and counselling, and hospital costs associated with miscarriage. Adverse events were assumed to be equal across both groups. The costs to relatives were excluded. The resource quantities and the unit prices were reported for hospital costs, as well as the average cost per patient. The treatment costs incurred by the patient were recorded as dollar amounts only. Resource use was measured during 1996 to 1999 and was priced at 1998 prices.

**Statistical analysis of costs**
The costs were not treated stochastically.

**Indirect Costs**
Discounting was, again, not appropriate. The study recorded time lost to "work or normal home duties" after treatment. Only a total dollar amount per person and the daily rate for lost income (based on local pay rates) were reported.

**Currency**
New Zealand dollars (NZ$). Some costs were also reported in US dollars ($) and UK pounds sterling (€).

**Sensitivity analysis**
Sensitivity analysis was applied to the hospital costs for laser treatment and to the drug treatment costs for OI, both independently (one-way sensitivity analysis) and jointly (two-way sensitivity analysis).
Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The total per patient costs, including adverse events, were NZ$2,593.23 for LOD and NZ$5,461.29 for OI.

The incremental cost of OI over LOD was also reported in US dollars ($3,645) and UK pounds sterling (2,132).

Synthesis of costs and benefits
Although the authors referred to their study as a cost-minimisation analysis, they did report both the cost per pregnancy and the cost per live birth for LOD and OI.

The cost per pregnancy was $10,938 for LOD and $16,549 for OI.

The cost per live birth was $21,095 for LOD and $28,744 for OI.

The authors expressed concern that the lack of miscarriages in this small sample might have been due to chance (other studies have found similar rates of miscarriage). Consequently, they assumed that the miscarriage rates in the LOD group were the same as those in the OI group and reduced the number of live births from 8 to 4 accordingly.

No incremental costs were reported, nor was there any analysis by sub-group.

Sensitivity analysis took the form of re-calculating all categories of treatment costs at 125% and 150% of their original levels. The effect that these altered values had on the cost per live birth was not reported.

In a two-way sensitivity analysis, the cost-advantage of LOD remained even if the LOD costs were increased by 25% with a simultaneous 25% reduction in OI costs.

Only when the LOD costs were increased by 50%, with the OI costs simultaneously reduced by 50%, did OI achieve a slight cost-advantage.

No formal statistical analysis was reported.

Authors' conclusions
Laparoscopic ovarian diathermy (LOD) is considerably less expensive than ovulation induction (OI). The cost-advantage of LOD is likely to increase over time because LOD has been shown to improve the chances of subsequent pregnancies without further intervention. The probability of multiple pregnancies was reported as being a further disadvantage of OI. LOD was also reported to be preferable because of the ease of treatment that it offers women.

CRD COMMENTARY - Selection of comparators
The choice of OI as the comparator to LOD treatment was justified as representing current practice. You are advised to ensure that OI represents a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The study was based on a randomised controlled trial, which was appropriate for the study hypothesis. There was no evidence that the study sample was representative of the study population, although there was no reason to suppose that they were not. There was also no information on the comparability of the groups before treatment. The number of live births was adjusted on the basis of the assumption that the number of miscarriages was lower than might be expected. This may be misleading to anyone undertaking a meta-analysis of these data. It also appears questionable to base the number of miscarriages on the number of women in the study, rather than on the number of pregnancies, as it is impossible to miscarry unless pregnancy is achieved. The measures of benefit (pregnancies and live births) were taken
directly from the effectiveness analysis. The authors acknowledged that the two techniques each carry their own risk of complications. With drug therapy there is a risk that pregnancy might result in multiple births. For laser treatment there is a risk of adhesions and possible long-term effects on ovarian function. These have implications, both for the health of the patient and for the costs.

**Validity of estimate of measure of benefit**
The measure of benefit was taken directly from the clinical study. Please see the comments under the 'Validity of estimate of measure of effectiveness' field (above).

**Validity of estimate of costs**
As the authors noted, the restriction of the follow-up period to 6 months and the possible exclusion of longer term consequences might have resulted in some understatement of the costs. The cost estimates were derived from small sample sizes. The reporting of the price year, resource use and unit costs was good.

**Other issues**
The authors compared their findings with those from a modelling exercise that came to similar conclusions about the cost of the two treatments. Caution was expressed with respect to the small scale of the study and women's preferences over treatment modalities. The authors also pointed out that the context of a publicly funded health care system might not be generalisable to, for example, the US health care system in which hospital costs might be higher.

**Implications of the study**
The findings implied that LOD should be used in preference to OI.

**Source of funding**
Supported by a grant from the Auckland Medical Research Foundation.

**Bibliographic details**

**PubMedID**
15070878

**DOI**
10.1093/humrep/deh219

**Other publications of related interest**
Farquhar CM. A randomized controlled trial of laparoscopic ovarian diathermy versus gonadotrophin therapy for women with clomiphene resistant polycystic ovarian syndrome. Fertility and Sterility 2002;78:401-11.

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Clomiphene /therapeutic use; Drug Resistance; Electrocoagulation /economics; Female; Fertility Agents, Female /therapeutic use; Gonadotropins /administration & dosage /economics; Health Expenditures; Humans; Laparoscopy /economics; Polycystic Ovary Syndrome /drug therapy /economics /surgery; Pregnancy; Pregnancy Outcome
Accession Number
22004000674

Date bibliographic record published
30/11/2005

Date abstract record published
30/11/2005