Cost-effectiveness analysis of salpingectomy prior to IVF, based on a randomized controlled trial

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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.

Health technology
Women with hydrosalpinges, mostly diagnosed by hysterosalpingography or by laparoscopy, were given a laparoscopic salpingectomy before undergoing their first cycle of in vitro fertilisation (IVF). A comparator group of women started their IVF treatment with the opportunity of having a salpingectomy after a failed IVF cycle.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised women who were going to undergo IVF treatment, who had been diagnosed with ultrasound visible hydrosalpinges.

Setting
The setting was secondary care in Sweden, Denmark, Norway and Iceland.

Dates to which data relate
The dates to which the effectiveness and resource evidence referred were not given in this paper. The price year was 2004.

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

Link between effectiveness and cost data
The same patients provided the cost data and the effectiveness data. The costing was carried out retrospectively.

Study sample
Power calculations were reported in an earlier effectiveness paper (Strandell et al. 1999, see ‘Other Publications of Related Interest’ below for bibliographic details). There were 204 patients in the main study, 116 randomised to salpingectomy before IVF and 88 randomised to the comparator group. Six patients in each group did not start the IVF treatment. Five patients in the intervention group had IVF treatment before surgery, whilst one in the comparator group had surgery before starting her IVF treatment. Of the 204 patients, 95 (51 in the intervention group and 44 in the control group) were diagnosed with ultrasound visible hydrosalpinges. The results of the 95 women with ultrasound
visible hydrosalpinges were analysed separately. The focus in the current paper was the results of the 95 women with ultrasound visible hydrosalpinges, although some information was given on the larger study sample as well.

**Study design**
This was a multi-centre, randomised, controlled trial (RCT). Women were randomised in a ratio of 3:2 at each centre. Full details of the randomisation process were given elsewhere (Strandell et al. 1999). The patients were followed up until they produced a live birth or until treatment had been completed. Loss to follow-up was not reported.

**Analysis of effectiveness**
The analysis was conducted on an intention to treat basis. The primary health outcome was the achievement of a live birth. The potential complications of IVF were also reported. Information on the comparability of the treatment groups in the larger study was given elsewhere (Strandell et al. 1999).

**Effectiveness results**
Among the 95 women whose hydrosalpinges were visible on ultrasound, the live birth rate was 60.8% in the intervention group and 40.9% in the control group. The difference was 19.9% (95% confidence interval, CI: -0.4 to 40.1). Four (9%) patients in the control group and 5 (10%) patients in the intervention group suffered from complications.

Among the total study sample, the live birth rate was 57 births for 106 patients in the intervention group and 41 births for 86 patients in the control group. Full details were given elsewhere (Strandell et al. 2001, see ‘Other Publications of Related Interest’ below for bibliographic details).

In terms of side effects, 12 (11%) patients in the intervention group suffered from complications, 10 from ovarian hyperstimulation syndrome (OHSS) and 2 from infections. In the control group, 11 (12%) patients suffered from complications, 7 developed OHSS, 3 suffered from pelvic infections and 1 needed laparotomy for adnexal torsion.

**Clinical conclusions**
The clinical conclusions were that salpingectomy before a woman starts IVF treatment, when performed on a woman with hydrosalpinges diagnosed by ultrasound, increases the live birth rate in comparison with the situation where salpingectomy is offered to women after they have started IVF treatment.

**Measure of benefits used in the economic analysis**
The measure of benefits used was the live births gained as a result of the intervention.

**Direct costs**
Discounting was not carried out. The quantities and the costs were not analysed separately. The costs measured were for the anaesthetic and surgical facilities necessary for the salpingectomy, hospital stay after salpingectomy, postoperative complications, drugs used in the IVF treatment and follow-up visits, costs arising from IVF complications, costs of dealing with spontaneous abortions, ectopic pregnancies and termination of pregnancies, antenatal care, the different methods of delivering the baby, and neonatal care. The quantity data came from the hospitals, but the dates to which they referred were not given. The prices used for medication were the retail prices of the Swedish pharmacy chain Apoteket. The costs of treatment were taken from the charges at the main Swedish centre in the trial, Sahlgrenska University hospital. The price year was 2004.

**Statistical analysis of costs**
The costs were reported as mean values with standard deviations and as mean differences between groups, providing 95% CIs. The authors used bootstrapping to calculate the 95% CIs for the incremental cost-effectiveness ratios (ICERs).
and for the differences between groups (with 1,000 repetitions).

**Indirect Costs**

No indirect costs were calculated.

**Currency**

Swedish kroner (SEK). The conversion rate to euros (EUR) was EUR 1 = SEK 9.0.

**Sensitivity analysis**

The authors assessed the effect of taking the indirect costs of patients taking a week's leave after surgery into consideration.

**Estimated benefits used in the economic analysis**

The live birth rate was 19.9% higher in the intervention group among women with ultrasound visible hydrosalpinges.

Benefits were estimated until a live birth or until the end of treatment.

Side effects were not considered in the economic analysis.

**Cost results**

Excluding the costs of neonatal care, the cost per patient among patients with ultrasound visible hydrosalpinges was EUR 13,943 for patients in the intervention group and EUR 12,091 for patients in the control group. The cost-difference was EUR 1,852 (95% CI: 57 to 3,646).

Among the patients in the larger study sample, the cost per patient (excluding the costs of neonatal care) was EUR 13,818 in the intervention group and EUR 13,030 in the control group. The cost-difference was EUR 788 (95% CI: -552 to 2,129). The costs of adverse effects were dealt with in the analysis.

The costs were calculated during the patient's hospital stay and until the patient gave birth.

**Synthesis of costs and benefits**

The cost per live birth (excluding neonatal costs) was EUR 22,823 in the intervention group and EUR 29,517 in the control group.

The cost per live birth (including neonatal costs) was EUR 27,374 in the intervention group and EUR 38,915 in the control group.

Among patients with ultrasound visible hydrosalpinges, the ICER for an extra live birth was EUR 9,306 (95% CI: -8,653 to 60,867).

The sensitivity analysis, which assessed the effect of patients taking a week's leave after surgery, resulted in an estimate of EUR 11,342 for the ICER.

Among the whole patient sample, the cost per live birth was EUR 25,684 in the intervention group and EUR 27,316 in the control group.

**Authors' conclusions**

Salpingectomy given to women with ultrasound visible hydrosalpinges before they start in vitro fertilisation (IVF) treatment would result in a higher live birth rate. The cost of the extra birth rate was very reasonable.
CRD COMMENTARY - Selection of comparators
The comparator, optional salpingectomy performed after an IVF cycle has failed, was justified by it being current practice in many settings. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness
The source of the effectiveness data was a single study. The study design, an RCT, was appropriate for the study question. The study sample appears to have been representative of the study population; full information on this and on comparability was given elsewhere (Strandell et al. 1999). The analysis of effectiveness was handled credibly. There were no other sources of effectiveness data.

Validity of estimate of measure of benefit
The measure of health benefit was obtained directly from the effectiveness analysis. It did not include any of the side effects of surgery or IVF treatment. The authors argued that the complication rate was similar in the two treatment groups and, therefore, its inclusion would not affect the results.

Validity of estimate of costs
From the cost perspective adopted (i.e. that of the hospital), it seems that all the relevant categories of cost have been considered in the cost estimation. However, when the authors were making cost comparisons between the two patient groups, they decided to exclude the cost of neonatal care. They argued that the higher neonatal costs in the control group were due to it having a higher incidence of twin births, something which would not occur in a larger sample. It was unclear why the authors reported data on neonatal costs and then did not use them. However, it is interesting to note that including the cost of neonatal care made a large reduction in the extra cost of the intervention treatment, and in the larger study sample the cost per patient was actually lower in the intervention group.

The costs and the quantities were not reported separately, which will limit the generalisability of the authors' results. The resource use quantities were taken from a single study, while the prices were taken from published sources and the authors' setting. No statistical, sensitivity or any other kind of analysis of the quantities was performed, and no sensitivity analysis of the prices was conducted. Charges used by the hospital were used as a proxy for prices of treatments and interventions. The use of charges to proxy costs has the limitation of not reflecting true opportunity costs, thus restricting the external validity of the results. The date to which the prices referred was recorded, and this increases the reproducibility of the results. Discounting was not carried out. There was insufficient information on the time span of the treatment to ascertain whether or not discounting was required.

Other issues
The authors made appropriate comparisons of their results with those from other studies. The issue of generalisability to other settings was not addressed explicitly, although the authors pointed out that the cost of salpingectomy depended very much on how long the patient stayed in hospital and that cost could be reduced. The authors did not present their results selectively, but it was unclear why they included so much information on the entire study sample when the focus of the study was on women with ultrasound visible hydrosalpinges. Their conclusions reflected the scope of the analysis. The authors referred to the small patient sample as a disadvantage of the study.

Implications of the study
The authors did not make any recommendations for policy or practice.

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Other publications of related interest


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MeSH
Adult; Birth Rate; Birth Weight; Cost-Benefit Analysis; Denmark; Embryo Implantation; Embryo Transfer; Fallopian Tube Diseases /economics /surgery; Fallopian Tubes /surgery /ultrasonography; Female; Fertilization in Vitro /economics /methods; Humans; Iceland; Infertility, Female; Norway; Ovulation Induction; Pregnancy; Pregnancy Outcome; Pregnancy Rate; Reproductive Techniques, Assisted /economics; Sweden; Time Factors; Treatment Outcome

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