Cost-effectiveness of magnetic resonance-guided focused ultrasound surgery for treatment of uterine fibroids

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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 estimate the cost-effectiveness of magnetic resonance guided focused ultrasound surgery (MRgFUS) in the treatment of symptomatic uterine fibroids compared with the current practice. The authors concluded that MRgFUS was likely to be cost-effective. The methodology was appropriate, although further details of the clinical studies used should have been reported for assessment of their internal validity. The conclusions reached by the authors appear to be appropriate given the scope of the study.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to estimate the cost-effectiveness of treatment for symptomatic uterine fibroids using magnetic resonance guided focused ultrasound surgery (MRgFUS) compared with the current treatment using uterine artery embolisation (UAE), myomectomy and hysterectomy.

Interventions
The study compared the use of MRgFUS with current practice, which was UAE, myomectomy and hysterectomy.

Location/setting
UK/secondary care.

Methods
Analytical approach:
A Markov model was used to simulate the natural history and to provide projections of possible outcomes and costs for the two treatment strategies. The time horizon of the study was the lifetime of the patient. The authors reported that the perspective adopted in the economic analysis was that of the UK National Health Service (NHS).

Effectiveness data:
The effectiveness data were derived from clinical studies conducted at InSightec (the manufacturing company of MRgFUS). The results from these studies were combined and the outcomes were extrapolated to a lifetime, using transitional probabilities of recurrence derived from the literature. The main clinical effectiveness estimate was the relationship between nonperfused volume (NPV), relative to the total fibroids volume, and the rate of the alternative treatment.

Monetary benefit and utility valuations:
The utility estimates were derived from one of the InSightec trials and were taken at six months after treatment for patients undergoing MRgFUS. The quality of life score was derived using the SF-36 and converted into a utility value using the SF-6D. Based on findings from published studies, the authors assumed that the quality of life score was the same for MRgFUS as for other treatments, and that this score did not change beyond six months after treatment.

Measure of benefit:
The measure of benefit was the number of quality-adjusted life-years (QALYs) gained.
Cost data:
The direct costs were those relating to initial and subsequent hospitalisations and outpatient services such as day procedures, diagnostic tests, medical personnel and medication costs and equipment. The hospital costs of MRgFUS were derived from estimates of resource use obtained from a hospital trust in London. In order to generalise the costs to the UK, these costs were adjusted to UK average prices using the Market Forces Factor (MFF). Other hospital costs and resource use data were mainly derived from published estimates. The unit costs were obtained from the NHS Reference Costs and the Personal Social Services Research Unit. The medication costs were obtained from the British National Formulary and the Scottish Prescription Cost Analysis. All costs were reported in UK pounds sterling (£). As they could be incurred over the lifetime of the patient, discounting was performed using an annual rate of 3.5%.

Analysis of uncertainty:
The uncertainty in the model was evaluated using a series of one-way and two-way sensitivity analyses by varying the definition of current practice, the NPV ratio, the age of patients, the number of procedural deaths, the recurrence rates, the complication rates, the quality of life, and the treatment costs. In addition, probabilistic sensitivity analyses, where probability distributions are presented for each parameter, were also performed. The results of these analyses were presented using cost-effectiveness acceptability curves.

Results
In the base-case scenario, the total costs of treating 1000 women using MRgFUS were £3,101,644 compared with £3,396,913 using current practice. The QALYs gained using MRgFUS were 10,793.874 compared with 10,783.216 using current practice. As MRgFUS was found to be dominant over current practice (i.e. it was both more effective and less costly), the costs and QALYs were not combined.

The results were robust to the one- and two-way sensitivity analyses. The probabilistic sensitivity analyses showed that for approximately 86% of simulations, MRgFUS was dominant.

Authors' conclusions
The authors concluded that a treatment strategy for symptomatic uterine fibroids starting with MRgFUS was likely to be cost-effective.

CRD commentary
Interventions:
The interventions were well described and their selection was justified. The study was thorough in its coverage of the interventions in its setting.

Effectiveness/benefits:
The effectiveness data were derived mainly from pooling the results of clinical studies, which were conducted by the manufacturer of the intervention. The authors provided very few details of these studies, and as a result, it is not possible to comment on their internal validity. To extrapolate the results over the long-term, the authors derived further effectiveness information from published studies and literature. Again, however, limited information was provided on these sources. The authors provided adequate details on how the utilities were derived and estimated. In addition, they clearly reported the assumptions made to extrapolate the utility values.

Costs:
The perspective was that of the NHS. The authors provided a detailed description of the method used to derive the cost information, the sources used, and the assumptions made. Furthermore, in order to make their costs generalisable to the rest of the UK, when appropriate, the costs were adjusted using the MMF. The authors did not explicitly report the price year used, which will hamper any future inflationary exercises. As costs could be incurred over the lifetime of the patient, discounting was appropriately performed.

Analysis and results:
Overall, the analytical approach was well reported, with the model structure being described in detail and graphically represented. Additionally, the results were fully and clearly presented. The authors performed exhaustive sensitivity analyses including a probabilistic sensitivity analysis, as well as one- and two-way analyses. The authors also
acknowledged the main limitations to their analysis.

Concluding remarks:
The methodology of the study was appropriate, although further details of the clinical studies used should have been reported to assess their internal validity. The conclusions reached by the authors appear to be appropriate given the scope of the study.

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