Cost analysis of abdominal, laparoscopic, and robotic-assisted myomectomies

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Record Status
This is an economic evaluation that meets the criteria for inclusion on NHS EED.

CRD summary
The aim was to evaluate the economic impact of three different surgical approaches for myomectomy in women in the USA. The authors concluded that abdominal myomectomy was the least expensive option compared with traditional laparoscopy and robotic-assisted myomectomy. The methodology of the study was adequate. The authors did not make strong recommendations, which was appropriate given the uncertain clinical evidence base.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to evaluate the economic impact of three different surgical approaches for myomectomy in women in the USA.

Interventions
Abdominal surgery, traditional laparoscopy and robotic-assisted myomectomy were compared. Laparoscopic surgery was minimally invasive but required advanced surgical skills. Robotic-assisted surgery enabled three-dimensional perception of the surgical site and allowed more surgeons to perform complex laparoscopic surgery.

Location/setting
USA/Secondary care

Methods
Analytical approach:
The authors used a decision tree model to synthesise data from a systematic search of the published literature for all outcomes of the interventions of interest. The authors stated that the study perspective was that of an academic medical centre.

Effectiveness data:
The authors assumed equivalent surgical outcomes for all three interventions (on the basis of three published studies). Other operative outcomes of interest were length of operative time, conversion risk and rates, transfusion risk and length of stay. Baseline estimates and ranges for these operative outcomes were identified from a systematic literature review of the PubMed database. Studies were assessed on size and quality. Baseline estimates were based on the highest quality and largest available.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Not relevant.

Cost data:
The authors used a micro-costing approach to estimate costs relevant to the hospital perspective. Cost categories included hospital equipment and resources, robotic equipment and intraoperative, perioperative and postoperative staff and hospital costs. Resource use and price information was based on Medicare reimbursement by Current Procedural Terminology (CPT) codes for physician reimbursement, costs of procedures from analysis of data from the author’s medical centre, expert opinion and the cost of the robot from Intuitive Surgical. Two scenarios were analysed: one with purchase and maintenance costs of the robot and one without. Costs of purchase was written off over a period of seven...
years at an interest rate of 5%.

Analysis of uncertainty:
One-way sensitivity analysis was conducted on what the authors felt were the key model cost parameters; these included increased hospital stay and increased surgeon fee.

Results
The estimated length of stay for abdominal surgery was two days compared with 1.6 days for traditional laparoscopy and 1.5 days for robotic-assisted myomectomy.

Abdominal surgery was the least expensive approach. It was estimated to cost US $4,397 compared with $6,199 for traditional laparoscopy and $7,280 for robotic-assisted myomectomy.

Abdominal surgery remained the least expensive treatment unless the surgeon's fee increased above $2,390 or the length of stay became greater than 4.3 days; in these cases traditional laparoscopy became least expensive.

Authors’ conclusions
The authors concluded that abdominal myomectomy was the least expensive option compared with traditional laparoscopy and robotic-assisted myomectomy.

CRD commentary
Interventions:
The interventions included appeared relevant and the authors seemed to attempt to include the appropriate comparators for their study setting. It was likely that introduction of robotic technology was relevant to other settings and that the comparators reflected generalisable practice.

Effectiveness/benefits:
The focus of the model was costs. There was an assumption of equivalence in surgical outcomes and no consideration of health-related quality of life. This was in part due to a lack of evidence to the contrary and also to enable cost drivers to be determined. The authors discussed the limitations of this approach in full. Operative outcomes were allowed to differ between interventions. Methods for identifying and selecting data were reported in sufficient detail. It appeared that the best available evidence was incorporated in the model. The level of reporting was good. Tables with parameter estimates were presented.

Costs:
The costs were highly relevant to the stated study perspective and the source of cost data was well described. Methods used to estimate cost data were described adequately in the text. A table of key cost estimates with the range of uncertainty was provided. The authors report neither the price year nor whether they performed other cost adjustment techniques. The generalisability of the costs was likely to be poor.

Analysis and results:
The methods were generally well reported. The time horizon of the analysis was not stated explicitly and this made the results slightly difficult to interpret. The key assumptions of equal outcomes from the alternative surgical techniques needed further validation as the methodological quality of the references supporting these assumptions was unclear. The authors recognised that the impact of different surgical techniques on quality of life was a key omission. The authors conducted one-way sensitivity analysis; more complex multivariate sensitivity analysis would have been a more thorough method of assessing the joint impact of multiple parameter uncertainty on results. As stated by the authors, the main focus of this paper was costs.

Concluding remarks:
The methodology of the study was adequate. The authors did not make strong recommendations, which was appropriate given the uncertain clinical evidence base.

Bibliographic details
