Use, costs and comparative effectiveness of robotic assisted, laparoscopic and open urological surgery

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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
This study aimed to evaluate the perioperative costs and outcomes of laparoscopic and open urological surgery. The authors concluded that robot-assisted laparoscopic surgery was more costly, but had fewer complications and transfusions, and a shorter hospital stay; prospective studies were needed. Given the quality of the evidence, the few details of the costs, and uncertainty in whether the best available evidence was used, this study is insufficient to judge the cost-effectiveness of robot-assisted laparoscopic and laparoscopic surgery.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study aimed to evaluate the patterns of care and the perioperative costs and outcomes of laparoscopic and open urological surgery.

Interventions
Laparoscopic surgery was compared with robot-assisted laparoscopic surgery and open surgery.

Location/setting
USA/secondary care.

Methods
Analytical approach:
The cost-effectiveness analysis was based on one clinical study. Procedure-related complications were analysed. The authors did not state the study perspective.

Effectiveness data:
The clinical outcomes were mortality, length of stay, and complications. These were assessed for four procedures: radical prostatectomy, nephrectomy, partial nephrectomy, and pyeloplasty. The relative effectiveness of the procedures was from the retrospective cohort study of data from the Healthcare Cost and Utilization Project (HCUP). These data were a 20% stratified probability sample of about eight million acute hospital stays, from more than 1,000 hospitals in 42 states, per year. Propensity scoring methods were used to identify three treatment groups with comparable patient characteristics.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
There was no summary measure of benefit. The clinical outcomes of the treatments were compared.

Cost data:
The cost data were from the same source as the clinical data – the HCUP. A cost-to-charge ratio was applied to try to capture the opportunity costs excluding profit. The cost data were from 2008, and the currency was US $.

Analysis of uncertainty:
Treatment groups were compared using probabilities calculated by linear and logistic regression.

**Results**

Robot-assisted and laparoscopic surgery were associated with lower in-hospital mortality than open surgery (p<0.001). They were associated with fewer transfusions for radical prostatectomy, and laparoscopic surgery had fewer transfusions than robot-assisted and open surgery for nephrectomy and pyeloplasty (p<0.001). Robot-assisted and laparoscopic surgery were associated with a shorter hospital stay (p<0.002), and fewer respiratory, wound, and vascular complications (all p<0.024).

Robot-assisted surgery had the highest costs for every procedure, followed by laparoscopic surgery for radical and partial prostatectomy.

**Authors' conclusions**

The authors concluded that robot-assisted laparoscopic surgery was most costly, but had fewer complications and transfusions, and a shorter hospital stay than open surgery. Prospective studies were required to confirm these results.

**CRD commentary**

**Interventions:**
The interventions were briefly described. All three interventions were used in clinical practice, so they were relevant for local decision-making.

**Effectiveness/benefits:**
The outcomes were from a retrospective observational study, which could have introduced bias in the data. Efforts were made to control for known confounding factors, using propensity scores, but there remained the possibility of confounding. The number of patients in each group was not stated. The relevant patient health outcome appears to have been broadly captured by the clinical outcomes.

**Costs:**
No information was provided on the cost items that were included. All costs that were incurred by the hospital are likely to have been included, covering the cost of surgery and the treatment of complications. The study perspective was not stated, but the use of a cost-to-charge ratio was designed to estimate the opportunity cost, which indicated a societal or health care provider perspective. The price year was reported. It appears that discounting was not necessary as the data were collected over three months.

**Analysis and results:**
The analysis and results were adequately reported; the combined outcomes may or may not have been worth the extra cost of robot assistance. The authors discussed the limitations of their analysis, but provided little discussion of other economic evaluations and of other clinical evidence comparing these treatments. It seems unlikely that the best available evidence was used.

**Concluding remarks:**
Given the quality of the evidence, the few details of the costs, and the uncertainty in whether the best available evidence was used, this study by itself does not give sufficient evidence to judge the cost-effectiveness of robot-assisted laparoscopic and laparoscopic surgery.

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**Bibliographic details**