A prospective comparison of the costs of reusable and limited-reuse laparoscopic instruments

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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
Laparoscopic instrumentation: reusable and limited-reuse laparoscopic hook cautery instruments and curved scissors in the operating room of a tertiary care hospital.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients requiring, and surgeons performing, laparoscopic procedures.

Setting
Hospital. The economic study was carried out in Canada.

Dates to which data relate
The effectiveness and resource use data related to the curved scissors were collected between April and December 1995. The effectiveness and resource use data related to the hook cautery instrument were collected between April 1995 and July 1996. The fiscal year was not clearly reported but it was stated that the purchase costs of the instruments were stable during the study period.

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

Link between effectiveness and cost data
The costing was performed prospectively on the same sample as that used in the effectiveness study.

Study sample
Power calculations were not used to determine the sample size. There were 143 recorded cases of use of 8 curved scissors, consisting of 76 cases of use of three reusable scissors against 67 cases of use of five limited-reuse scissors. This arm of the study was discontinued earlier than planned because of a mistake made by an operating room employee. In the hook cautery instrument trial, a total of 12 limited-reuse and 4 reusable instruments was used in 494 surgical procedures, of which 24% were excluded. Of the remainder, 201 cases were performed by using reusable hook cautery instruments and 175 cases were performed with limited-reuse instruments.
Study design
The study was a randomised controlled trial, carried out in a single centre. The duration of the study was 8 months in the curved scissors instrument arm and 15 months in the hook cautery instrument arm. All the investigators and participating surgeons were blinded to the number of times each instrument was used. The loss to follow up was 6% in the curved scissors instrument arm and 24% in the hook cautery instrument arm.

Analysis of effectiveness
The analysis of effectiveness was based on treatment completers only. The clinical outcome measures used were the average number of times each instrument was used, the durability of the instruments (requiring sharpening, repair), and satisfaction of the surgeon with the instrument’s performance.

Effectiveness results
The average number of times of use of reusable scissors was 25 versus 13 for the limited-reuse variety. The average number of times of use of a reusable hook cautery instrument was 50 versus 17 for the limited-reuse instruments. Regarding durability of the instruments, all three reusable scissors needed sharpening, one after being used 15 times and the other two after 20 times; three of four reusable hook cautery instruments needed insulation repair. Regarding surgeon satisfaction with the instrument’s performance, the reusable scissors had an average satisfaction rating of 3.9 (5=excellence) versus 3.8 for the limited-reuse scissors. Stability of ratings over time and over number of uses was established. The corresponding rating for the reusable hook cautery instruments was 4.4 versus 3.5 for the limited-reuse variety. The ratings decreased with the number of uses for the limited-reuse hook cautery instruments but were stable for the reusable instruments.

Clinical conclusions
The study revealed that reusable hook cautery instruments were more effective than their limited-reuse counterparts. Regarding the early discontinuation of the curved scissors arm of the study because of violation of the randomisation protocol, the study demonstrated that "in a busy operating room ... Ensuring familiarity with the instrumentation and study protocol can be difficult”.

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic study, and only separate clinical outcomes were reported.

Direct costs
The costs were not discounted. The quantities and cost items were reported separately. The cost items considered were the purchase costs, and the costs of sharpening and repair. The perspective adopted was that of the hospital. The cost data were obtained from the manufacturers or the hospital. The price date was not clearly reported but it was stated that the purchase costs of the instruments were stable during the study period. The costs of reprocessing were omitted as they were thought to be common to both alternatives.

Indirect Costs
Not considered.

Currency
Canadian dollars (Can$).

Sensitivity analysis
No sensitivity analysis was performed.
Estimated benefits used in the economic analysis
Not applicable.

Cost results
The reusable scissors cost Can$1,200 versus Can$130 for the limited-reuse variety. The reusable hook cautery instruments cost Can$225 versus Can$88 for the limited-reuse alternative.

Synthesis of costs and benefits
The average cost per use was calculated as a measure of synthesis of costs and benefits. The reusable scissors had an average cost of Can$48.60 per use versus Can$10 per use for the limited-reuse scissors. The reusable hook cautery instruments had an average cost of Can$5.15 per use versus Can$5.18 for the limited-reuse variety.

Authors' conclusions
Reusable hook cautery instruments were better than their limited-reuse counterparts. Rigorous attempts to compare the cost of laparoscopic instruments may be limited by their rapid evolution in design and the availability of many types of instruments on the market.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of benefit
The estimates of the effectiveness results are likely to be internally valid due to the randomised design adopted in the study.

Validity of estimate of costs
Adequate details of cost estimation were given.

Other issues
The estimation of cost per use for the instruments may not be valid due to the short study period. Given the lack of sensitivity analysis and statistical analysis of the costs, the results may need to be treated with some caution. It was reported that rapid advances in instrument design poses problems in conducting studies with long period of follow-up.

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