Cost-effectiveness of laparoscopy versus laparotomy for initial surgical evaluation and treatment of potentially resectable hepatic colorectal metastases: a decision analysis

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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 examine the cost-effectiveness of performing laparoscopy prior to laparotomy in patients with potentially resectable hepatic colorectal cancer in comparison with laparotomy alone. The authors concluded that pre-operative laparoscopy was a potentially cost-effective alternative to laparotomy for the management of hepatic metastases, especially in the subgroup of high-risk patients, for whom the findings were more robust. The study was well conducted and presented and the authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to examine the cost-effectiveness of performing laparoscopy prior to laparotomy in patients with potentially resectable hepatic colorectal cancer (CRC) in comparison with laparotomy only.

Interventions
Laparoscopy prior to laparotomy was compared with laparotomy based on standard pre-operative evaluation such as computed tomography.

Location/setting
USA/hospital.

Methods
Analytical approach:
This economic evaluation was based on a decision modelling analysis with a five-year time horizon, which was assumed to represent the patient life expectancy. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical data came from a literature review, the methods and conduct of which were reported. The key clinical endpoint was the rate of resectability. The search for the input data found five cohort studies, one of which had the largest sample size and was used as the primary source of data. Other data were selected on the basis of the most consistent estimate among those found in the literature. Survival after one or five years from the initial procedures was taken from two published reviews.

Monetary benefit and utility valuations:
The utility estimates were derived from the literature, but little information on their sources was provided.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure and were discounted at an annual rate of 3%.

Cost data:
The economic analysis considered the costs of laparotomy with and without resection, laparoscopy, professional time for the procedures, and loss of productivity for patients. The value of time was based on average wage rates. Direct
medical costs were derived from official Medicare reimbursement rates and referred to 2005 prices. Other cost data were obtained from published studies. The resource use data were based on published sources and authors' opinions. All costs were in US dollars ($).

Analysis of uncertainty:
A deterministic one-way sensitivity analysis was undertaken to address the issue of uncertainty. Alternative values were derived from published sources, often identified through the literature review, but not used in the base-case analysis. The utility values and costs were varied within ranges defined by the authors. A scenario analysis was also performed on the probability of resectability during laparotomy in a high-risk cohort.

Results
The expected costs were $26,810 with laparotomy alone and $26,310 with pre-operative laparoscopy and QALYs were 2.69 with laparotomy alone and 2.71 with laparoscopy. In this base case, pre-operative laparoscopy was the dominant strategy as it was simultaneously less expensive and more effective than immediate laparotomy, especially in the subgroup of high-risk patients, where cost-savings were greater.

The sensitivity analysis highlighted the impact of the utility values and probability of resectability. Changes in utility values showed the instability of the model due to the relatively small difference in QALYs between the two strategies. If the probability of finding resectable disease with laparoscopy increased to over 92% (it was 90% in the base case), then laparoscopy was no longer dominant, although it remained cost-effective.

Authors' conclusions
The authors concluded that pre-operative laparoscopy was a potentially cost-effective alternative to laparotomy for the management of hepatic metastases from CRC, especially in the subgroup of high-risk patients, for whom the findings were more robust.

CRD commentary
Interventions:
The rationale for the selection of the two strategies was clear. These two procedures were likely to be relevant in other settings.

Effectiveness/benefits:
The authors performed a literature review to identify the relevant sources of data. The specific inclusion and exclusion criteria were not reported, but the design of the source studies and the approach used to select the clinical data from those found in the literature were reported. In general, the clinical study appears to have been conducted satisfactorily. The sources of the utility estimates were not described in detail. QALYs are a valid benefit measure, which capture the impact of the interventions on both quality of life and survival. Both of these are relevant dimensions of health for patients with potentially resectable disease. QALYs also allow cross-disease comparisons.

Costs:
The analysis of costs was consistent with the perspective. Some costs were presented as macro-categories and were not broken down into single items. This may reduce the transparency and transferability of the economic analysis, but it is consistent with the use of Medicare sources for the estimation of health service costs and wide ranges of values were tested in the sensitivity analysis. The costs and quantities were treated deterministically, and no statistical analyses were carried out. The price year and other details of the economic analysis were reported. The authors stated that no discounting was applied as there were no differences in costs between the two options after the first year.

Analysis and results:
The use of an incremental approach to synthesise the costs and benefits was appropriate, given the superior profile of one procedure over the other. The issue of uncertainty was appropriately addressed and considered the impact of all model inputs on the findings. The authors underlined the high uncertainty around their results, especially related to the probability of resectability of patients receiving laparoscopy. Different results might be obtained with alternative patient populations.
Concluding remarks:
The study was well conducted and presented and the authors’ conclusions appear to be valid.

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