Is laparoscopic colectomy for cancer cost-effective relative to open colectomy?

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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
The study examined the use of laparoscopic-assisted colectomy (LAC) and conventional open colectomy (OC) for the treatment of cancer.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis, cost-utility analysis

Study population
The study population comprised a cohort of patients with colorectal cancer requiring colectomy.

Setting
The setting was a hospital. The economic study was carried out in New Zealand.

Dates to which data relate
The clinical data and resource use information were derived from studies published between 2001 and 2005. The price year was 2004.

Study designs and other criteria for inclusion in the review
The clinical data used in the analysis were the time to resume normal household activity and the time to recover physical and social activity after LAC or OC.

Sources searched to identify primary studies
The estimates were derived from two published randomised clinical trials (RCTs). Each estimate came from a single study. Thus, these estimates were not pooled. The authors reported few details of either of these studies.

Methods used to derive estimates of effectiveness
The primary studies were identified from a recent meta-analysis of RCTs. The search criteria were not reported.

Measure of benefits used in the economic analysis
Three summary benefit measures were used: two in the cost-effectiveness analysis (CEA) and one in the cost-utility analysis (CUA). In the CEA, the benefits were time to resume normal household activity and time to recover physical and social activity, as derived directly from the RCTs. In the CUA, these recovery times were expressed in terms of health-related quality-of-life (HRQoL) in order to calculate quality-adjusted life-years (QALYs). The authors converted recovery times into HRQoL using the EQ-5D instrument. New Zealand social tariffs were used to convert health states to utility weights. Given the short time horizon, discounting was not necessary.

Direct costs
The analysis of the costs included only direct medical costs, which was appropriate as the viewpoint of a public hospital system was adopted. The macro-categories of costs considered were theatre time, reusable equipment, disposable equipment and post-operative stay (POS). The unit costs and the quantities of resources used were presented separately for most cost items. Much of the resource use data were derived from the meta-analysis of RCTs, which included 6
studies. Data were pooled to obtain a unique estimate for each category of resource use. However, estimates of resource use from each RCT were also presented. Some assumptions were also made. The unit costs were obtained from a public hospital (Dunedin Public Hospital). Discounting was not relevant as short-term costs were considered. The price year was 2004.

**Statistical analysis of costs**
The costs and quantities were treated deterministically.

**Indirect Costs**
No productivity costs were considered.

**Currency**
New Zealand dollars (NZD).

**Sensitivity analysis**
Two deterministic univariate sensitivity analyses were carried out. The first was performed using the minimum and maximum estimates of the extra theatre time and POS obtained from the RCTs included in the meta-analysis. The second used minimum and maximum estimates of LAC's usage of disposable equipment. The sources of the alternative values were reported.

**Estimated benefits used in the economic analysis**
The mean gain in time to resume normal household activity with LAC over OC was 12 days. The mean gain in time to recover physical and social activity with LAC over OC was 33 days.

The mean gain in QALYs with LAC over OC was 0.018 when based on the estimation of time to resume normal household activity, and 0.049 when based on the estimation of time to recover physical and social activity.

**Cost results**
The per patient additional cost associated with LAC over OC was NZD 1,267 (range: -259 to 3,808).

LAC was associated with higher costs for operating theatre time and disposable usage that were not totally offset by a reduction in costs associated with lower POS.

**Synthesis of costs and benefits**
Incremental cost-effectiveness ratios and cost-utility ratios were calculated in order to combine the costs and benefits of the alternative strategies.

Using the two definitions of recovery time, the incremental cost per recovery day saved with LAC over OC was NZD 38 (in the case of time to resume normal household activity) and NZD 106 (in the case of time to recover physical and social activity).

The incremental cost per QALY gained with LAC over OC was NZD 70,389 (range: dominant to NZD 211,556) when QALYs were calculated using time to resume normal household activity, and NZD 25,857 (range: dominant to NZD 77,714) when QALYs were calculated using time to recover physical and social activity.

The results of the sensitivity analysis showed the conditions under which LAC had the most favourable and the most unfavourable (best- and worst-case scenarios) cost-utility ratios, and showed high variability in cost-effectiveness ratios.

**Authors' conclusions**
The authors concluded that the use of laparoscopic-assisted colectomy (LAC) for patients with cancer was cost-effective in comparison with conventional open colectomy (OC) for the lower of the cost estimates. However, for
higher cost estimates, LAC was not likely to be cost-effective from the perspective of a public hospital in New Zealand.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparators was clear in that the new minimally invasive procedure was compared with the standard procedure. The rationale for comparing these two alternatives in terms of costs and benefits was clear. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The effectiveness analysis was based on data derived from RCTs, which usually have a high internal validity because of their randomised design. Moreover, these studies were included in a larger meta-analysis and this should ensure the robustness of the clinical estimates. However, the authors did not describe the approach used to identify these clinical trials, and few details of the trials themselves were given. Clinical estimates were not varied in the sensitivity analysis.

**Validity of estimate of measure of benefit**
The benefits used in the CEA were derived directly from published RCTs and represent an intermediate measure of the impact of the interventions on patient health. The approach used to calculate QALYs in the CUA framework was described. EQ-5D represents a widely used and validated instrument with which to assess HRQoL. QALYs are potentially comparable with the benefits of other health care interventions. Utility weights were based on values obtained from New Zealanders, which represents a strength of the study.

**Validity of estimate of costs**
The analysis of the costs was consistent with the authors' stated perspective. Given this perspective, it appears that all the relevant cost categories have been included. The costs were presented as macro-categories, with some key information on unit costs and quantities of resources used being provided. This could aid the replication of the analysis in other settings. The source of the unit costs was reported, and the authors stated that the hospital from which these estimates were derived was representative of other hospitals in New Zealand. However, the resource use data were derived from a meta-analysis of RCTs and it was unclear whether these data were easy to transfer to the authors’ context. Both the costs and resource use estimates were varied in the sensitivity analysis over a large range of values. The price year was reported, which will facilitate reflation exercises in other time periods.

**Other issues**
The authors did not compare their findings with those from other studies. The issue of the transferability of the study results to other settings was partly addressed in that the authors stated that the data were derived from several trials which involved hundreds of surgeons and dozen of hospitals. This suggests that the findings of the study should be generalisable to everyday surgical practice in many settings, particularly in New Zealand and Australia. The sensitivity analysis was restricted to variations in resource use data, whereas the issue of potential uncertainty surrounding the clinical estimates was not investigated. The authors noted that the study did not incorporate the effects of differences in postoperative complication rates on hospital costs.

**Implications of the study**
The study results suggest that LAC has the potential to be a cost-effective alternative to traditional OC in patients with cancer. The authors noted that, as surgeons gain more experience with LAC, operating times and conversion rates should decrease, thus making LAC more cost-effective.

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None stated.

**Bibliographic details**

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Other publications of related interest
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