Shortened length of stay and hospital cost reduction with implementation of an accelerated clinical care pathway after elective colon resection

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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
This study compared two clinical pathways for patients undergoing elective, open, large bowel resections. The authors’ report of the postclinical pathway (alternative strategy) is detailed below.

Postoperatively, the patient was admitted to a regular surgical unit and mobilised on the evening after surgery. The extent of mobilisation depended on the individual patient. The majority of patients were mobilised to a chair on the evening after surgery and ambulated 3 times during the course of the first postoperative day. On the morning of postoperative day 1, the nasogastric tube was removed and the patient was started on sips of clear liquids, excluding carbonated beverages. On postoperative day 2, the epidural and Foley catheters were removed and the patient was allowed an unrestricted clear liquid diet. Patients were then discharged on the evening of postoperative day 2 or the morning of postoperative day 3, provided they were tolerating a liquid diet and were able to take adequate doses of pain medication by mouth. Before discharge took place, patients received postoperative teaching pertaining to diet, activity and return of bowel function.

The preoperative and operative procedures for the alternative technology were described in detail in the paper, but are not reported here as no such detail was provided for the preclinical pathway group (the comparator technology). However, the authors reported that comparator group of patients had their nasogastric tube removed when they passed flatus and were discharged when they had a bowel movement.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised all those patients who attended the clinical practice of the paper’s senior author, and who underwent elective colon resections for cancer or diverticular disease from August 1997 to December 2000. The authors reported that patients who were admitted to the hospital on days before surgery, or through the emergency department, were excluded from the study.

Setting
The setting was secondary care (Massachusetts General Hospital). The economic study was carried out in the USA.

Dates to which data relate
The effectiveness data were collected between August 1997 and December 2000. The resource use data appear to refer to the same period. The dates for the prices and costs were not reported.
Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
Details of how the costing was undertaken were not reported.

Study sample
The sample size necessary to assure a certain power was not determined in the planning phase of the study. In addition, power calculations were not carried out retrospectively. The sample was made up of the whole study population. The authors did not justify the choice of the patient sample in terms of the characteristics of the disease and/or treatment under investigation, or the generalisability of the findings. There were 138 patients in the study. Of these, 52 were operated on before the implementation of the clinical pathway (preclinical pathway) and 86 were operated on after the implementation of the clinical pathway (postclinical pathway). The postclinical pathway patients were subdivided into two categories, those operated on before January 2000 who were sent home on an unrestricted diet (46 patients) and those operated on after January 2000 who were sent home on an amended diet (40 patients). There was no report of patients refusing to participate in the study. The number of patients excluded from the study was not reported.

Study design
This was a retrospective cohort study that was carried out in a single centre, the Massachusetts General Hospital, Boston (MA), USA. The follow-up period was unclear, although it would appear that readmissions within 30 days of surgery were included. Loss to follow-up was not reported. All the patients included in the study appear to have been accounted for in the analysis.

Analysis of effectiveness
The analysis of the clinical study included all patients who were operated on. The primary health outcomes were LOS, postoperative complications and readmission rate. In terms of baseline characteristics, the mean age (+/- standard deviation, SD) of the patients was 69 (+/- 13) years in the preclinical pathway group and 62 (+/- 14) years in the postclinical pathway group, (p=0.004). There were 30 female patients in the preclinical pathway group compared with 35 in the postclinical pathway group, (p=0.056). The authors also reported the p-value for the difference in diagnosis, (p=0.073) and operation type, (p>0.05) between the groups. However, it was unclear how these p-values were derived. Adjustments for age, gender, diagnosis and type of operation were carried out using a multiple regression analysis when looking at the difference in LOS between the groups.

Effectiveness results
The mean LOS (+/- SD) was 6.6 (+/- 3.3) days in the preclinical pathway group and 3.7 (+/- 1.5) days in the postclinical pathway group, (p=0.001). When adjusted for age, gender, diagnosis and type of operation, the difference in LOS remained statistically significant, (p<0.001).

The mean LOS with readmissions (+/- SD) was 6.9 (+/- 4.1) days in the preclinical pathway group and 4.2 (+/- 2.8) days in the postclinical pathway group, (p<0.001).

The number of complications was 13 (25%) in the preclinical pathway group versus 10 (12%) in the postclinical pathway group, (p=0.058).

The number of readmissions was 1 (2%) in the preclinical pathway group versus 8 (10%) in the postclinical pathway group, (p=0.089).

Clinical conclusions
The authors concluded that a clinical pathway for elective, open colon resections could be conducted safely and that it
would lead to improvements in LOS.

**Measure of benefits used in the economic analysis**
The authors did not derive a summary measure of benefit. In effect, a cost-consequences analysis was performed.

**Direct costs**
The resource quantities and the costs were not reported separately. The authors reported that hospital costs, including operative costs and hospital stay but excluding the surgeon's fee, were included in the analysis. Details of the individual costs and the sources of the direct costs were not reported. Details of how the costs were estimated were also not reported. Discounting would have been methodologically relevant, as the costs were incurred during more than 2 years, but it was unclear whether or not it was undertaken. The dates to which the price data referred were not reported.

**Statistical analysis of costs**
The authors reported data on patient age and LOS as the mean (+/- SD) and on costs as the mean (+/- standard error, SE). Other patient characteristics and effectiveness results were reported as numbers (with percentages). The authors reported that they used the 2-sample t-test and Fischer(s exact test to determine the level of significance of differences in characteristics and LOS between the two patient groups. The 1-tailed t-test was used to determine the statistical difference in cost between the two groups. The authors did not justify the tests used. It does not appear that the clinical evidence was powered to detect a given statistical difference.

**Indirect Costs**
The indirect costs were not reported.

**Currency**
US dollars ($).

**Sensitivity analysis**
Details of any sensitivity analyses were not reported.

**Estimated benefits used in the economic analysis**
See the 'Effectiveness Results' section.

**Cost results**
The mean cost (+/- SE) for surgical admission was $8,790 (+/- 3,680) for preclinical pathway patients and $6,490 (+/- 2,290) for postclinical pathway patients, (p<0.001).

The mean cost (+/- SE) for surgical admission and readmission was $9,310 (+/- 5,170) for preclinical pathway patients and $7,070 (+/- 3,670) for postclinical pathway patients, (p=0.002).

**Synthesis of costs and benefits**
The costs and benefits were not synthesised.

**Authors' conclusions**
The implementation of a clinical pathway for elective, open colon resections can be done safely with improvements in cost and length of stay (LOS).
CRD COMMENTARY - Selection of comparators
The comparator represented standard practice in the authors' setting prior to March 1999. You should decide if this is a widely used health technology in your own setting.

Validity of estimate of measure of effectiveness
The analysis was based on a retrospective cohort design which, although not ideal, does enable a preliminary view of the effectiveness of the alternative technology to be ascertained at minimal cost. The study sample was representative of the study population. However, it should be noted that, as the study population was limited to patients under the care of a single physician at a single site, it might not have been representative of the population of people requiring colon resections. The patient groups were not comparable at analysis. The authors reported differences in age, gender, diagnosis and type of operation between the groups. The analysis of effectiveness was handled credibly, with appropriate analyses undertaken to account for confounding factors.

Validity of estimate of measure of benefit
No summary benefit measure was used in the economic analysis as a cost-consequences analysis was performed. The reader is therefore referred to the comments in the ‘Validity of estimate of measure of effectiveness’ field (above).

Validity of estimate of costs
Full details of the costing process were not reported in this paper. The authors reported that the total hospital cost per patient, including the operative costs and hospital stay and excluding the surgeon's fee, were calculated. However, for the perspective of the analysis, perhaps the surgeon's fee should have been included. The costs were not reported separately from the quantities. The resource use quantities were estimated from retrospective reviews of patient charts. A sensitivity analysis around the quantities was not conducted. The source of the prices and unit costs was not reported. There was no evidence to suggest that charges were used to proxy prices. The date to which the prices referred was not reported.

Other issues
The authors appear to have made appropriate comparisons of their findings with those from other studies. The issue of generalisability to other settings was not addressed. The authors do not appear to have presented their findings selectively and the conclusions reflected the scope of the analysis. The authors reported a number of further limitations to their study. In particular, the reduction in complication rate over time could have been due, at least in part, to the increase in surgical experience of the one surgeon who operated on all of the patients. The authors also noted that patients were not randomised to a particular clinical pathway.

Implications of the study
The authors suggested that clinical pathways may represent an ideal solution to reduce costs while improving patient care, by standardising preoperative, postoperative and intraoperative care.

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