Implementation of a clinical pathway decreases length of stay and cost for bowel resection

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
Use of a clinical pathway for small and large bowel resection. The areas targeted by the clinical pathway were: length of stay, in terms of earlier discharge planning, nasogastric tube removal and diet advancement, nasogastric tube (criteria for removal standardised), bowel preparation commercially available kit utilised), antibiotics (perioperative use changed to 1 preoperative and 3 postoperative doses), and deep vein thrombosis prophylaxis (subcutaneous heparin only).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was patients in diagnostic related group (DRG) 148 and 149 undergoing small and large bowel resection with or without complications. Patients undergoing ileoanal pull through procedures were excluded because a separate pathway for their care was already in use. There were no other exclusion criteria.

Setting
The study setting was secondary care, namely the Department of Surgery, University of Cincinnati Medical Centre, Cincinnati, Ohio. The economic study was conducted in the USA.

Dates to which data relate
The year of pathway implementation was not stated, but by proxy it can be assumed to have been 1995 since costs were converted to 1995 dollars. Effectiveness data were collected one year before pathway implementation and one year after. All costs were converted to 1995 dollars. 1995 prices were used.

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

Link between effectiveness and cost data
Costing was undertaken retrospectively before pathway implementation and prospectively after the implementation on the same patient sample as that used in the effectiveness analysis.

Study sample
Data analysis was carried out primarily for 3 groups of patients undergoing bowel resection:
patients in the year before pathway implementation (prepathway), 167 (78 male, 89 female, mean age 57.1 years +/- 1.3);

patients in the year after pathway implementation but not placed on the pathway (nonpathway), 69 (30 male, 39 female, mean age 56 +/- 2.3); and

patients placed on the pathway (pathway), 101 (44 male, 57 female, mean age 59.6 years +/- 1.6).

In addition, a fourth group (post-pathway), comprising all patients from the nonpathway and pathway groups, was compared to the prepathway group (n=170, 74 male, 96 female, mean age 55.7 years +/- 1.4). Power calculations related to the sample size were not performed.

**Study design**
The study took the form of a single centre, nonrandomised trial with historical controls. The duration of follow-up was one year after clinical pathway implementation.

**Analysis of effectiveness**
The analysis was based on intention to treat. The main health outcomes used in the analysis were length of hospital stay, timing of NG tube removal and replacement, diet advancement, deep vein thrombosis occurrence, IV antibiotic use, readmission and mortality rates. Patients in the nonpathway group were, on average younger than the prepathway or pathway patients, (p<0.05), but similar in terms of male/female composition. Also, there were no statistically significant differences in group composition in terms of illness severity as measured by the APR - DRG (refined DRG) severity scores (scaling from 1 to 4 for each patient).

**Effectiveness results**
The total length of stay was significantly less for patients in the pathway group (9.41 days) as compared to the prepathway group (12.53 days), (p<0.05).

NG tube removal and advancement to a clear liquid diet occurred significantly earlier in the postpathway group as compared to the prepathway group, (p<0.05) and in the pathway group as compared to the prepathway and nonpathway groups, (p<0.05).

Advancement to a regular diet occurred earlier in the postpathway group as compared to the prepathway group, (p<0.05), and in the pathway group as compared to the prepathway group, (p<0.05). 

Morbidity and mortality data by group are shown below:

NG replacement: prepathway, 12.30%; postpathway, 11.76%; nonpathway, 5.41%; pathway, 14.63%;

DVT occurrence: prepathway, 2.63%; postpathway, 3.1%; nonpathway, 4.69%; pathway, 2.02%;

IV antibiotics: prepathway, 18.83%; postpathway, 15.95%; nonpathway, 20.31%; pathway, 13.13%;

readmissions: prepathway, 11.76%; postpathway, 17.61%; nonpathway, 22.58%; pathway, 14.43%; and

mortality: prepathway, 6.59%; postpathway, 3.53%; nonpathway, 5.80%; pathway, 1.98%.

Chi square test revealed no significant difference between the groups (p>=0.05).

**Clinical conclusions**
The clinical pathway for small and large bowel resection is a safe way of treating patients with this condition.
Measure of benefits used in the economic analysis
The authors did not provide a summary measure of benefits. As such, a cost-consequence approach was adopted.

Direct costs
Direct health service costs were considered such as room, pharmacy, lab, radiology and respiratory procedures. However, quantities and unit costs were not given separately. Cost data were supplied by the Decision Support Services of the Health Alliance of Greater Cincinnati, of which the study hospital is a member. 1996 charges were converted to 1995 costs. All costs were expressed in 1995 dollars. 1995 prices were used. Costs were not discounted due to the short duration of the study.

Statistical analysis of costs
ANOVA analyses followed by Duncan's test were performed on costs.

Indirect Costs
Indirect costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
The reader is referred to the effectiveness results reported above.

Cost results
The mean (+/- SEM) cost per hospital stay was $19,997 (+/- 1,244.61) for patients in the prepathway group, $20,835.28 (+/- 2,286.26) for those in the nonpathway group and $13,908.53 (+/- 1,113.01) for those in the pathway group, (p<0.05).

Synthesis of costs and benefits
Costs and benefits were not combined due to the cost-consequences approach adopted.

Authors' conclusions
The pathway produced significant decreases in length of stay and cost. There appeared to be no increase in mortality or morbidity in the pathway patients.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator, non-pathway treatment for bowel resection, was clear, as both treatment pathway and nonpathway alternatives for bowel resection were used in the authors' setting. You, as a database user, should consider if the same applies to your own setting.

Validity of estimate of measure of effectiveness
The study was not randomised and only allowance for confounding by time (pre versus post pathway) was made. This
means that the validity of the effectiveness results is therefore reduced. The patient groups were comparable in some of their baseline characteristics, but patients in the nonpathway group were, on average, younger than the prepathway or pathway patients, (p<0.05). Given the presence of uncertainty, and the fact that no power calculations were performed, the lack of statistically significant difference does not mean no difference at all. However, most clinical indicators were better for the pathway.

**Validity of estimate of measure of benefit**
The authors did not provide a summary measure of benefits and so a cost-consequence approach was adopted. The reader is referred to the validity of effectiveness results reported above.

**Validity of estimate of costs**
Details of cost estimation were scarce. Quantities and costs were not presented separately, and charges were converted to costs. On the plus side, costs were statistically analysed. Discounting was not performed due to the short duration of the study.

**Other issues**
The results may not be generalisable to other settings, especially given that there was no sensitivity analysis. Such issues were discussed by the authors. Comparisons were made with other studies, although no references were reported. The authors do not seem to have presented their results selectively and admit that, since there was an improvement for all post pathway patients, increased scrutiny as well as the pathway itself, might be responsible for the cost savings.

**Implications of the study**
With the reservations noted above, these results support the further development of clinical pathways for general surgical procedures.

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