Colonoscopy or sigmoidoscopy as the initial evaluation of pediatric patients with colitis: a survey of physician behavior and a cost 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.

Health technology
Two diagnostic strategies (methods): initial flexible sigmoidoscopy versus initial colonoscopy for the evaluation of patients with colitis-type symptoms.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Preadolescent and adolescent patients with colitis-type symptoms (diarrhoea, rectal bleeding, etc.) and negative stool cultures, suggestive of inflammatory bowel disease.

Setting
Hospital. The economic study was carried out in Michigan, USA.

Dates to which data relate
The effectiveness data were derived from published literature between 1979 and 1993, and from a single survey study, the date of which was not specified. The date for resources used was not given but the charge data were obtained from a survey study, the date of which was not specified. The price year used in the analysis was not stated.

Source of effectiveness data
The evidence for final outcomes was derived from a review of the literature and a single survey study.

Link between effectiveness and cost data
The charge data were obtained from the same survey as that used for the assessment of the medical practice.

Study sample
Power calculations were not used to determine the sample size. A total of 119 pediatric gastroenterology programmes selected from a nation-wide sample were surveyed. A total of 38% did not respond to the survey.

Study design
The study was a cohort study.
Analysis of effectiveness
The principle used in the analysis of the effectiveness results (intention to treat or treatment completers only) was not specified. The outcomes used in the effectiveness analysis were: the percentage of physicians performing initial flexible sigmoidoscopy or colonoscopy; use of sedation (>75% of the time); the percentage of physicians (from those performing initial flexible sigmoidoscopy) who would perform colonoscopy if diffuse colitis extends proximal to rectosigmoid, the percentage who would perform colonoscopy if evidence of Crohn's disease were found on flexible sigmoidoscopy, the percentage who would complete colonoscopy if diffuse colitis extends proximal to rectosigmoid, the percentage who would complete colonoscopy if Crohn's disease were in rectosigmoid area; the percentage of physicians (from physicians performing colonoscopy) who would complete colonoscopy if diffuse colitis extends proximal to rectosigmoid, and the percentage who would complete colonoscopy if Crohn's disease were in rectosigmoid area.

Effectiveness results
The percentage of physicians performing initial flexible sigmoidoscopy was 36% against 64% for colonoscopy.

The use of sedation more than 75% of the time was 78%.

The percentage of physicians (from physicians performing initial flexible sigmoidoscopy) who would perform colonoscopy if diffuse colitis extends proximal to rectosigmoid was 56%.

The percentage who would perform colonoscopy if evidence of Crohn's disease found on flexible sigmoidoscopy was 52%.

The percentage who would complete colonoscopy if diffuse colitis extends proximal to rectosigmoid was 50%.

The percentage who would complete colonoscopy if Crohn's disease in rectosigmoid area was 58%.

The percentage of physicians (from those performing colonoscopy) who would complete colonoscopy if diffuse colitis extends proximal to rectosigmoid was 82%.

The percentage who would complete colonoscopy if Crohn's disease in rectosigmoid area was 96%.

Clinical conclusions
Recognition, prior to the procedure, that knowledge of the extent of disease is important to the physician, should lead to the more cost-effective choice of initial colonoscopy.

Modelling
A decision analysis program (Data 2.5, Tree Age, Boston, MA, USA) was used to estimate the cost-effectiveness of the two strategies. A decision tree was used.

Outcomes assessed in the review
The outcomes assessed in the review were: incidence of Crohn's disease versus ulcerative colitis for pediatric patients, incidence of patients with indeterminate colitis, incidence of patients with colonic involvement in Crohn's disease, incidence of Crohn's patients with rectosigmoid involvement, relative incidence of the extent of disease in ulcerative colitis for patients with pancolitis versus for patients with limited rectosigmoid disease.

Study designs and other criteria for inclusion in the review
Not stated.
Sources searched to identify primary studies
Not stated

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
At least 14 studies were included in the review.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
Based on the survey results and a review of the literature the outcome values estimated were:

- incidence of Crohn's disease versus ulcerative colitis for pediatric patients was 0.6, and 0.4;
- incidence of patients with indeterminate colitis was 0.10;
- incidence of patients with colonic involvement in Crohn's disease was 0.60;
- incidence of Crohn's patients with rectosigmoid involvement was 0.70;
- relative incidence of the extent of disease in ulcerative colitis was 0.62 for patients with pancolitis versus 0.37 for patients with limited rectosigmoid disease.

Measure of benefits used in the economic analysis
The percentage of physicians, who would proceed following each scenario, was calculated in the decision model.

Direct costs
Quantities and costs were not reported separately. All charges due to the interventions consisting of professional, room, medication and recovery room, and pathology charges were included. The cost items were not reported separately. The main cost measure was the median charge ratio (total charges for flexible sigmoidoscopy/total charges for colonoscopy) as a proxy for true cost ratio. The quantity/cost boundary was not stated. The price date was not stated. The costs associated with side-effects of the two health technologies were not included since they were assumed to be common to the alternatives.

Indirect Costs
Not performed.
Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was carried out varying the incidence of ulcerative colitis, the relative cost ratio of flexible sigmoidoscopy to colonoscopy, the incidence of limited rectosigmoid disease in ulcerative colitis, and the incidence of rectosigmoid sparing in Crohn's colitis.

Estimated benefits used in the economic analysis
The percentage of physicians following strategies 1 to 4 respectively was 67%, 16%, 4%, and 13%.

Cost results
Flexible sigmoidoscopy had a median total charge of $609 (average: $729, range: $68 to $1,860). Colonoscopy had a median total charge of $1,386 (average: $1,389, range: $210 to $2,770). The median procedure charge ratio was 0.48 (range: 0.27 - 0.88).

Synthesis of costs and benefits
The estimated benefits and costs were combined: the most cost-effective strategy was dependent on whether knowledge of the extent of the disease for ulcerative colitis and/or Crohn's colitis was important to the physician.

When knowledge of the extent of disease was important to the physician for both ulcerative colitis and Crohn's colitis, colonoscopy (cost per patient of $1,386) was more cost-effective than flexible sigmoidoscopy (cost per patient of $1,805). This decision was sensitive only to a variation in the cost-ratio: if the cost-ratio were less than 0.18, flexible sigmoidoscopy was favoured.

When knowledge of the extent of disease was not important for either ulcerative colitis and Crohn's colitis, an initial flexible sigmoidoscopy was more cost-effective with a cost per patient of $979 against $1,386 for initial colonoscopy (a saving of 29%). This decision was sensitive only to the cost-ratio: if the cost-ratio were > 0.77, colonoscopy was favoured.

When knowledge of the extent of disease was important for Crohn's colitis and not ulcerative colitis, costs were similar whether flexible sigmoidoscopy or colonoscopy was the initial procedure. Strategy costs were equal at $1,386. This decision was sensitive to the cost-ratio of the procedures. If the cost ratio were greater than 0.48, and also if incidence of ulcerative colitis were less than 0.53, then colonoscopy was favoured.

When knowledge of the extent of disease was important for ulcerative colitis and not Crohn's colitis, the cost per patient using colonoscopy was $1,386 less than the cost per patient ($1,398) for an initial sigmoidoscopy (negligible cost saving). This decision was sensitive to both variations in the cost ratio, and the incidence of limited rectosigmoid disease in ulcerative colitis. Colonoscopy was favoured at a cost ratio of more than 0.47 and when the incidence of limited rectosigmoid disease in ulcerative colitis was less than 0.39.

Authors' conclusions
When recognised prior to the procedure that extent and distribution of the disease are essential for patient care, colonoscopy as the initial test, can save 23% of work up costs. However, if knowledge of the extent and distribution of disease is not considered important by the physician at the time of diagnosis, an initial flexible sigmoidoscopy could save up to 30% of workup costs. When the extent and distribution of disease may be important, costs are similar whether flexible sigmoidoscopy or colonoscopy is the initial procedure.

CRD COMMENTARY - Selection of comparators
Although no alternative health technologies was explicitly stated as a comparator, both the strategies examined were common initial methods for the diagnostic evaluation of patients with colitis-type symptoms.

**Validity of estimate of measure of benefit**
Scant information is given regarding the literature search and the sources searched to identify primary studies. It is therefore difficult to judge the extent to which all relevant studies were included and, hence, to validate the estimates of measure of benefits.

**Validity of estimate of costs**
Cost data were based on charges and quantities and costs were not reported separately, thus making an assessment of the quality of the data difficult.

**Other issues**
Given the lack of randomisation, evidence for a systematic review of the literature, and statistical analysis of the costs, the results need to be treated with some caution.

**Source of funding**
None stated.

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