Diagnosing Crohn's disease: an economic analysis comparing wireless capsule endoscopy with traditional diagnostic procedures

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 use of wireless capsule endoscopy (WCE) for the diagnosis of Crohn's disease (CD).

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with suspected CD. Patients with a history of inconclusive diagnostic work-up were excluded.

Setting
The setting was secondary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness and some resource use data came from studies published between 1984 and 2004. The costs were estimated in 2002 and 2003. The price year appears to have been 2002.

Source of effectiveness data
The effectiveness data were derived from a synthesis of completed studies.

Modelling
A decision tree model was constructed to examine the costs of WCE versus traditional work-up in a hypothetical cohort of patients with suspected CD. The model considered the probability of complications associated with COL and SBFT, as well as the probability of capsule retention. Patients who failed initial diagnostic procedures with WCE or COL and SBFT underwent other diagnostic tests. The structure of the model was reported. A short time horizon was used.

Outcomes assessed in the review
The outcomes assessed from the literature were:

the diagnostic yield of WCE, traditional work-up and enteroclysis,
the rate of perforation with COL, and
the rate of retention with WCE.

**Study designs and other criteria for inclusion in the review**

The authors stated that a comprehensive review of the literature was undertaken to identify the primary studies. However, inclusion criteria and other details of the design of the primary studies were not reported.

**Sources searched to identify primary studies**

MEDLINE and CINAHL were searched using the keywords "wireless capsule endoscopy", "video capsule endoscopy", "M2A capsule", "diagnosis", "differential diagnosis", "cost" and "Crohn's disease".

**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**

Fifteen primary studies provided clinical data.

**Methods of combining primary studies**

The primary estimates were combined using weighted averages based on the number of patients participating in each study.

**Investigation of differences between primary studies**

Not stated.

**Results of the review**

The diagnostic yield was 69.59% with WCE, 53.87% with traditional work-up (average value of 59.14% with SBFT and 47.85% with COL), and 36.17% with enteroclysis.

The rate of perforation with COL was 0.03%.

The rate of retention with WCE was 0.75%.

**Measure of benefits used in the economic analysis**

No summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was performed.

**Direct costs**

The perspective of the study was that of the payer. The economic analysis considered only the costs of the diagnostic techniques, the treatment of complications (perforation due to COL and capsule retention), and other diagnostic tests. The unit costs were presented separately from the quantities of resources used. Most of the costs were estimated using average Medicare reimbursement rates, including professional and technical fees. The costs of other diagnostic tests were derived from a published study. Resource use was mainly based on published data. Discounting was not relevant since the costs were incurred during a short timeframe. The price year appears to have been 2002.
Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not considered in the economic evaluation.

Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was conducted to determine the robustness of the estimated costs to variations in assumptions in the range of diagnostic yields found in the published literature. A separate sensitivity analysis comparing enteroclysis and COL versus WCE was also carried out.

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

Cost results
The total cost per patient was $1,838.40 with COL and SBFT and $1,547.00 with WCE. The cost-difference was $291.

The primary sensitivity analysis showed that as long as the diagnostic yield for WCE was 64.10% or greater, WCE was the lower cost diagnostic option, regardless of the diagnostic yield of COL and SBFT.

In the separate sensitivity analysis, the pooled diagnostic yield for enteroclysis and COL was 40.04%, with the cost of the combined procedure being $840. This sensitivity analysis showed that the total cost for diagnosing CD using enteroclysis and COL was $2,165, compared with $1,547 for WCE (a cost-difference of $618 per patient). As long as the diagnostic yield for WCE was 60.13% or greater, WCE was the lower cost diagnostic option, regardless of the diagnostic yield of COL and enteroclysis.

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant since a cost-consequences analysis was carried out.

Authors' conclusions
Wireless capsule endoscopy (WCE) was an effective and efficient diagnostic approach for the detection of Crohn's disease (CD) in comparison with currently used work-up, including colonoscopy (COL) and small bowel follow through (SBFT) or enteroclysis.

CRD COMMENTARY - Selection of comparators
The authors provided a satisfactory justification for the choice of the comparators. Extensive information on all available options and reasons for the exclusion of some interventions were given. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a review of the literature. The search criteria were reported, but details of the design of the primary studies and characteristics of the patients were not reported. The issue of heterogeneity among
primary studies was not addressed, as the authors noted. The primary estimates were combined by calculating average values, weighted by the number of patients recruited in each study. Uncertainty surrounding the clinical inputs was investigated in the sensitivity analysis. The authors stated that a conservative estimate of the diagnostic yield of WCE was used.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

**Validity of estimate of costs**
The costs included were consistent with the perspective adopted in the study, although they were restricted to direct medical costs. Extensive information on the unit costs and quantities of resources used was provided, which enhances the possibility of replicating the results of the study in other settings. The costs were treated deterministically, but the impact of variations in clinical probability values on the total costs was estimated in the sensitivity analysis. The source of the costs was given. The price year was reported, which aids reflation exercises to other time periods. The authors stated that cost-savings associated with WCE were likely to have been underestimated because some potential benefits associated with an earlier diagnosis of CD were not accounted for in the analysis.

**Other issues**
The authors did not make extensive comparisons of their findings with those from other studies. They also did not address the issue of the generalisability of the study results to other settings. Some sensitivity analyses were carried out, which enhance in part the external validity of the study. The analysis referred to patients with suspected CD and this was reflected in the authors’ conclusions. The authors noted some limitations to the validity of their analysis, which have been highlighted already.

**Implications of the study**
The study results supported the use of WCE for the diagnostic work-up of patients with suspected CD.

**Source of funding**
Supported by a grant from Given Imaging Inc., Yoqneam, Israel.

**Bibliographic details**

**PubMedID**
15671786

**DOI**
10.1089/dis.2004.7.292

**Other publications of related interest**


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Algorithms; Crohn Disease /diagnosis /economics /physiopathology; Decision Trees; Diagnostic Services /classification /economics; Endoscopes, Gastrointestinal; Endoscopy, Gastrointestinal /economics /methods; Health Care Costs; Humans; Models, Econometric; Videotape Recording

**AccessionNumber**
22005000194

**Date bibliographic record published**
31/12/2005

**Date abstract record published**
31/12/2005