Management of obscure occult gastrointestinal bleeding: a cost-minimization analysis
Somsouk M, Gralnek IM, Inadomi JM

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.

CRD summary
This study examined the cost-effectiveness of alternative diagnostic strategies for the management of obscure occult gastrointestinal bleeding. Initial diagnosis with double-balloon enteroscopy was the least expensive strategy, followed by capsule endoscopy in cases where visual identification was not required or in settings where double-balloon enteroscopy was not available. The study was based on valid methodology and the authors' conclusions appear to be appropriate, despite some limitations in the available data.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to compare the costs and effectiveness of five strategies for the diagnosis and management of patients with obscure occult gastrointestinal bleeding. The patients had recurrent and refractory occult gastrointestinal bleeding, but their results were negative when tested with upper endoscopy and ileocolonoscopy.

Interventions
The five diagnostic strategies were: small-bowel follow through, enteroclysis, push enteroscopy, capsule endoscopy, and double-balloon enteroscopy (DBE). Depending on the results the initial diagnosis, another of the five diagnostic procedures could be used until a lesion was diagnosed or not.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision tree analysis was developed and populated with published clinical data, to compare the costs of the five strategies. The time horizon was not explicitly reported, but the clinical end-point of the model was either the treatment of occult gastrointestinal bleeding or the histological diagnosis of the lesion. Some assumptions were required and were reported. The authors stated that the third-party payer perspective was adopted.

Effectiveness data:
A review of the literature was undertaken in the MEDLINE database to identify the relevant sources for the clinical estimates. Some of the inclusion criteria were reported. Some of the selected studies directly compared the diagnostic strategies, but their designs and relevant details were not provided. The key clinical input was the diagnostic test sensitivity.

Monetary benefit and utility valuations:
None.

Measure of benefit:
No summary benefit was used. The authors assumed that the strategies were clinically equivalent and a cost-minimisation analysis was performed.

Cost data:
The economic analysis included the costs of biopsy, diagnostic procedures, and intra-operative enteroscopy, and
treatment of gastrointestinal bleeding and perforation. These costs were derived from the literature and official US national sources, such as the Centre for Medicare and Medicaid Services. In-patient use of resources was based on diagnosis-related group data, while out-patient resource use was derived from relevant national sources. The cost of DBE was based on official reimbursement rates. All costs were reported in US dollars ($) and the price year was 2006.

Analysis of uncertainty:
The parameter uncertainty, for all the model parameters, was tested using one-way sensitivity analysis and the most influential parameters were further tested in two-way sensitivity analysis. A probabilistic sensitivity analysis, using Monte Carlo simulation, was performed on the following parameters: test cost and sensitivity, test-complication rate, incomplete DBE rate, and lesion distribution. Two alternative models were also tested; in one, DBE was not an initial diagnostic strategy and, in the other, the model endpoint was the lesion identification without endoscopic intervention.

Results
In the base case, the least costly initial strategy was DBE with a total cost of $3,834 per patient, followed by capsule endoscopy ($4,263), small-bowel follow through ($4,311), enteroclysis ($4,331), and push enteroscopy ($4,408), which was the most expensive. One-way sensitivity analysis demonstrated that these results were sensitive to the cost and sensitivity of DBE.

The probabilistic sensitivity analysis demonstrated that, when treatment or histologic diagnosis was used as the model endpoint, the probability that DBE was the preferred strategy was 77%, while the rest of the strategies had probabilities of being the preferred strategy of less than 10%.

When DBE was not available as an initial test, capsule endoscopy was the least costly strategy with a probability of 45%. When the alternative endpoint was used, capsule endoscopy was again the least costly strategy ($1,826 per patient) and DBE and push enteroscopy were the most expensive strategies. These results were sensitive to the cost of DBE and capsule endoscopy.

Authors' conclusions
The authors concluded that DBE was the least costly strategy for the evaluation of obscure occult gastrointestinal bleeding, in patients with negative endoscopy and ileocolonoscopy, when the aim was treatment or conclusive diagnosis. When visual identification was not required, or DBE was not available, capsule endoscopy was the least expensive strategy.

CRD commentary
Interventions:
The authors justified their choice of interventions, which are likely to have been relevant in their setting. They compared conventional non-invasive diagnostic methods with newer ones. A description of all the alternatives was given.

Effectiveness/benefits:
The identification of clinical estimates was based on a review of the literature and the inclusion criteria and the sources searched were reported. The details on the selected studies, such as their design, sample size and evidence of their external and internal validity, were not reported. The authors highlighted the low quality of the available data and the lack of head-to-head comparisons between the diagnostic methods and extensive sensitivity analysis was performed to address these issues.

Costs:
The analysis of costs was consistent with the perspective and all the relevant categories of costs appear to have been included. The time horizon was not explicitly stated, but it appears that it was less than one year, and discounting was therefore not relevant. The sources of data were reported and appear to have been appropriate for the US setting. Most of the costs were only presented as macro-categories, and the unit costs and resource quantities were not reported separately, which will prevent the easy replication of the analysis for other settings. Other details were given, such as the price year, and the ranges over which the cost parameters were tested in the sensitivity analyses.
Analysis and results:
The model structure was presented in a diagram along with all the relevant details and modelling assumptions. The costs and benefits were not combined and, as equal clinical effectiveness was assumed among the strategies, a cost minimisation analysis was performed. The issue of uncertainty was satisfactorily addressed using both deterministic and probabilistic sensitivity analysis. The results of both the base case and the sensitivity analyses were presented clearly. The authors acknowledged that the quality of the available data was one important limitation to their study.

Concluding remarks:
The study was based on valid methodology and the authors' conclusions appear to be appropriate, despite some limitations in the available data.

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