Cost-benefit analysis of capsule endoscopy compared with standard upper endoscopy for the detection of Barrett's esophagus

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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.

CRD summary
The objective was to determine whether initial capsule endoscopy was cost-effective compared with standard sedated upper endoscopy in screening and detecting Barrett's esophagus in patients with chronic gastro-oesophageal reflux disease. The authors concluded that upper endoscopy was more effective and less costly than capsule endoscopy. The methods and reporting were good and the results appear to be reliable.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to determine whether initial capsule endoscopy was cost-effective compared with standard sedated upper endoscopy for screening and detecting Barrett's oesophagus in patients with chronic gastro-oesophageal reflux disease.

Interventions
The intervention was oesophageal capsule endoscopy followed by standard upper endoscopy, if Barrett's oesophagus was suspected, plus a biopsy. This was compared with upper endoscopy plus a biopsy to confirm intestinal metaplasia, if Barrett's oesophagus was suspected. Both these strategies were compared with no screening followed by oesophagectomy for any resectable cancer that developed.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision-tree was used to combine the lifetime estimates of costs and effectiveness, which were adapted from a published state-transition Markov model (Gerson, et al. 2004, see ‘Other Publications of Related Interest’ below for bibliographic details). This model compared no screening or surveillance for Barrett's oesophagus with screening with the option of oesophagectomy or endoscopic therapy as appropriate. The time horizon was lifetime and the authors stated that the perspective was that of the third-party payer.

Effectiveness data:
The evidence was from studies identified through a MEDLINE search for articles published between 1970 and 2006. The main clinical parameter was the sensitivity of the screening techniques in detecting Barrett's oesophagus.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The measure of benefit was life-years gained. These were discounted at 3% per annum.

Cost data:
The direct health costs of the facility, professional fees, reading of the results, and in-patient care were considered.
along with the costs of lost earnings, calculated using 2006 US average hourly rates, during the day of sedated endoscopy, to ensure that the analysis was not biased against oesophageal capsule endoscopy. Facility and professional fees were based on Medicare payments in 2005, while in-patient care costs were from the 2005 Medicare Prospective Payment System diagnosis related group. The costs of capsule endoscopy were based on the physician fees for the Current Procedural Terminology code. The costs were discounted at a rate of 3%.

Analysis of uncertainty:
A series of one-way, two-way, and multivariate sensitivity analyses was performed to assess the impact of variations in the key model parameters, across ranges identified in the literature, on the results.

Results
No screening for Barrett’s oesophagus with surgery for cancer had a cost of $901, capsule endoscopy cost $2,392, and standard endoscopy cost $1,968, for the average patient. The average life-years per patient were 18.30 with no screening, 18.36 with capsule endoscopy, and 18.54 with standard endoscopy.

The incremental cost-effectiveness of standard endoscopy compared with no screening was $4,530 per life-year gained. Capsule endoscopy was dominated by standard endoscopy, which means it was more costly and less effective.

The authors reported that the three factors that most influenced the cost-effectiveness in the sensitivity analysis were patient age, the sensitivity of standard endoscopy for detecting Barrett’s oesophagus, and the cost of standard endoscopy.

Authors’ conclusions
The authors concluded that initial standard endoscopy was more effective and less costly than capsule endoscopy in screening for Barrett’s oesophagus in patients with chronic gastro-oesophageal reflux disease.

CRD commentary
Interventions:
The interventions were well described and included an available alternative technique as well as no screening.

Effectiveness/benefits:
The effectiveness data were from several published studies that were identified through a structured literature review. The broad search terms were reported. The references and a description of the key studies that provided the evidence were given. It seems that the best available evidence was used.

Costs:
The authors reported the perspective and appear to have included all the relevant costs. They assumed the cost of capsule endoscopy and they included indirect costs for standard endoscopy, which was inconsistent with the perspective, but was justified by the authors and assessed in the sensitivity analyses. The remaining cost estimates were relevant to the population and setting and future costs were appropriately discounted.

Analysis and results:
The analytical approach was well described and diagrams of the models were presented. The sensitivity analyses were appropriate and the multivariable sensitivity analysis should have fully captured the parameter uncertainty. The authors acknowledged and highlighted the key limitations and assumptions of their study.

Concluding remarks:
The methods and reporting were good and the results appear to be reliable.

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