An economic analysis of an acid-reflux breath test in the evaluation of chronic cough
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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
This study assessed the cost-effectiveness of a new breath test for the diagnosis of acid-reflux cough compared with an evidence-based practice guideline diagnosis. The breath test was a cost-effective diagnostic strategy for patients with a chronic cough, but its cost-effectiveness depended on the prevalence of gastro-oesophageal reflux disease. The study appears to have used valid methodology, but the data sources were not fully reported. Caution is required when interpreting the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to assess the cost-effectiveness of a new diagnostic breath test for acid-reflux cough in comparison with an evidence-based practice guideline (EBPG) for the diagnosis of gastro-oesophageal reflux disease (GORD).

Interventions
Two strategies were examined. The test strategy was an acid-reflux breath test followed by three months of proton-pump inhibitor (PPI) therapy if the test was positive. The EBPG strategy was a trial of antireflux therapy with omeprazole for three months followed by 24 hours of pH testing for those who had not responded.

Location/setting
USA/primary and secondary care.

Methods
Analytical approach:
This economic evaluation was based on a decision analytic model with a one-year time horizon. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical data came from relevant studies which were selected by the authors. No information on the design and other characteristics of these studies, nor on the methods used to derive the clinical estimates from them, was provided. The main clinical estimates were the sensitivity and specificity of the acid-reflux breath test.

Monetary benefit and utility valuations:
Not included.

Measure of benefit:
The summary benefit measure was the proportion of correct diagnoses for each diagnostic strategy.

Cost data:
The economic analysis included the costs of the acid-reflux breath test, 24-hour pH testing, and drugs. The distribution of PPI usage was based on 2004 market shares. Other resource quantities were based on authors’ assumptions. The drug costs were derived from average wholesale prices and the costs of other items appear to have been based on published studies. All costs were in US dollars ($) and the price year was not explicitly reported.

Analysis of uncertainty:
The probabilistic uncertainty was investigated using a Monte Carlo simulation. The baseline parameters were also varied over a clinically reasonable range to determine the optimal strategy for various estimates of disease prevalence.

**Results**

In the base case, with a 36% prevalence of GORD, the expected cost per patient was $573 with the test and $899 with the EBPG. The rate of correct diagnosis was 92.1% with the test and 93% with the EBPG. The average cost per correct diagnosis was $622 with the test and $967 with the EBPG.

With increasing prevalence of GORD, the cost-effectiveness of the test strategy decreased and the EBPG became the preferred strategy when GORD prevalence was over 80%. The test strategy remained the most cost-effective over a wide range of medication costs, at theoretical rates of lower sensitivity, and as the cost of the trial of acid suppression decreased.

**Authors’ conclusions**

The authors concluded that the acid-reflux breath test was a cost-effective diagnostic strategy for patients with chronic cough, but its cost-effectiveness depended on the prevalence of reflux disease.

**CRD commentary**

**Interventions:**
The selection of the comparators was appropriate because the authors compared the most widely used approach with a newly available diagnostic test.

**Effectiveness/benefits:**
The clinical analysis was not extensively reported. The authors did not state how they identified the sources of data. These studies were probably known to the authors, but a systematic search would have been more comprehensive. No information was given on the design, patient sample, follow-up, and use of statistical tests, in these studies. The authors noted that the characteristics of the acid-reflux breath test were derived from a study with a small sample of patients. The criteria used to select the clinical estimates from those available in the studies, were not described. These issues limit the possibility of judging the validity of the clinical evidence. The summary benefit measure was disease-specific, but commonly used in diagnostic studies. It will be difficult to compare the benefits with those of other health care interventions. The authors acknowledged that the disease had a strong impact on patients’ quality of life, but this dimension of health was not incorporated in their model.

**Costs:**
The authors stated that a societal perspective was adopted, but only those costs that related to the diagnosis of the disease were included. The unit costs and quantities of resources used were reported, which improves the transparency of the economic analysis. The patterns of resource consumption were derived from a 2004 database, and it is unclear whether any changes had occurred since 2004. Some key details of the analysis such as the data sources and the price year were not described in detail. The cost estimates appear to have been treated deterministically.

**Analysis and results:**
The approach used to analyse the costs and benefits was appropriate, but only average cost-effectiveness ratios were calculated and incremental ratios would have been useful. The issue of uncertainty was only partially investigated as the sensitivity analyses were deterministic and focused on specific model inputs. It is unclear whether Monte Carlo simulation was used. The authors noted some limitations of their analysis, which have already been reported.

**Concluding remarks:**
The study appears to have used valid methodology, but the data sources were not fully reported. Caution is required when interpreting the authors’ conclusions.

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