Endoscopic ultrasonography for upper gastrointestinal submucosal lesions: a cost minimization analysis with an international perspective

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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
The use of endoscopic ultrasonography (EUS) for the diagnosis of upper gastrointestinal submucosal lesions.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised referring physicians who were questioned about their management of patients with SMTs by upper endoscopy.

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

Dates to which data relate
The effectiveness data were collected between January 1995 and January 1997. The dates during which the resource use data were collected were not reported. The price year was also not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out retrospectively on different samples of patients to the sample used for the effectiveness analysis.

Study sample
The authors took effectiveness data from a parent study they carried out. Details contained in this abstract relate only to those details reported in the current paper. The reader is referred to the parent study for further details (see Other Publications of Related Interest). The authors did not report that power calculations were carried out to estimate the impact of chance on the results. They also did not report the method used to select the sample. A total of 150 patients with SMTs by upper endoscopy were included in the study. These patients were appropriate for the study question. There was no control group.
Study design
The analysis was based on a case series analysis that assessed the impact of knowing the test results on patient management. Referring physicians were questioned as to what patient management would be pursued if EUS were not available. Once the EUS results were revealed, the physicians were questioned again to determine whether and how EUS information altered the management plan. The physicians were questioned again after 6 months to ascertain whether they actually followed the proposed course of action, and whether the patients had undergone surgery. The study was conducted at 23 centres (8 university hospitals and 15 community hospitals). The authors did not report details of any loss to follow-up.

Analysis of effectiveness
One aim of the study was to establish whether the patients were treated according to intention to treat. The primary health outcome was the comparison between proposed and actual patient management with and without EUS.

Effectiveness results
The authors did not report any effectiveness outcomes. Instead, for the economic analysis, they assumed that both the EUS and no EUS strategies were equally effective. Full effectiveness outcomes may have been presented in the parent study.

Clinical conclusions
The authors concluded that both patient management strategies were equally effective.

Modelling
A decision analytic model was constructed, using Data 3.5 (Treeage Software), to allow a comparison of the diagnosis of submucosal tumours with and without EUS.

Measure of benefits used in the economic analysis
The authors reported that a cost-minimisation analysis was carried out. As they based the economic analysis on therapeutic equivalence, they therefore did not estimate a summary measure of health benefit.

Direct costs
The costing was carried out from the perspective of the health care provider. The authors focused on the direct costs (room fees, nursing, sedation, monitoring, recovery room time, non-reusable supplies and physician professional fees). As the authors were concerned with the immediate diagnostic costs, the time horizon was very short and discounting was, appropriately, not used. The authors reported the unit costs for a range of diagnostic techniques and considered the expected costs of managing SMTs with and without EUS. Although they reported that costs were obtained from Germany, France, Japan, Canada and the USA, the specific sources were not reported. The total costs were obtained through the decision model. The dates when the resource use data were collected were not reported. A price year was also not reported. The authors did not report a currency conversion. Instead, to compare the relative costs, they calculated the ratio of specific costs to the cost of upper endoscopy for each country.

Statistical analysis of costs
The authors reported 95% confidence intervals of mean cost ratios across the countries.

Indirect Costs
The authors explicitly stated that indirect costs and out-of-hospital postprocedural costs were excluded from the analysis.
Currency
German marks (DM), Canadian dollars (Can$), Japanese yen (Y), French francs (Ffr) and US dollars ($).

Sensitivity analysis
A one-way sensitivity analysis was performed on all cost variables. Two- and three-way analyses were carried out as required. A threshold analysis was used to determine the threshold when the optimal treatment altered.

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

Cost results
Current EUS costs were DM199.5 in Germany, Can$190 in Canada, Y10,500 in Japan, Ffr3,656.7 in France and $338 in the USA.

Expected treatment costs with EUS were DM397 in Germany, Can$254 in Canada, Y13,959 in Japan, Ffr4,913 in France and $442 in the USA.

Expected costs without EUS were DM445 in Germany, Can$211 in Canada, Y10,593 in Japan, Ffr2,569 in France and $259 in the USA.

The threshold ratio (actual cost) of EUS cost to computed tomography cost that made treatment with EUS a less costly strategy was 0.7 (DM329) in Germany, 0.8 (Can$152) in Canada, 1.04 (Y7,561) in Japan, 1.71 (Ffr1,735) in France and 0.79 ($188) in the USA.

The change in EUS cost required to make EUS the less costly strategy was +DM129.5 (+65%) in Germany, -Can$38 (-20%) in Canada, -Y2,939 (-28%) in Japan, -Ffr1,921.7 (-53%) in France and -$150 (-44%) in the USA.

Synthesis of costs and benefits
Not relevant.

Authors' conclusions
Although "EUS (endoscopic ultrasonography) produces an impressive reduction in further testing, it will not reduce the overall cost of managing SMTs (submucosal tumours) if these variables (the risk and cost of potential complications caused by large-particle biopsy of high-risk lesions) are not in favour of an EUS-based strategy". The cost of computed tomography was the cost element with the greatest influence on the overall costs. EUS may reduce costs in some health care systems and increase costs in others.

CRD COMMENTARY - Selection of comparators
The authors aimed to assess the cost-effectiveness of using EUS as a diagnostic tool. The authors chose to compare conventional management with no EUS; it was unclear if there were any other comparator technologies that would have been relevant. Preferred practice in the authors' setting was EUS. You should decide if the comparison chosen is relevant in your own setting.

Validity of estimate of measure of effectiveness
The analysis was based on a case series analysis. Usually with a diagnostic-related technology we would expect to read evidence on the sensitivity and specificity of the technology; this information may well have been considered in the parent study. Nevertheless, the authors were ultimately concerned with the treatment proposed and actually received by the patient, and the case series analysis presented here addressed this study question well. As few details of the sample
selection process and summary statistics for the sample were not reported, it was not possible to assess whether the sample was representative of the population, or whether there may have been alternative factors that could have influenced the results. The reader is referred to the parent study.

Validity of estimate of measure of benefit
The analysis was based upon the therapeutic equivalence between EUS and no EUS. The economic analysis therefore included only costs and was explicitly described as a cost-minimisation analysis. The reader is referred to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The authors assumed the perspective of the health care provider. Appropriately, they considered only the direct costs of treatment covering the full spectrum of potential costs incurred. Sensitivity analyses were carried out to assess the key cost-drivers within the treatment regimen. The unit costs and the quantities were not reported separately. The authors calculated the costs of different diagnostic techniques and the costs of patient management with and without EUS for the complete range of countries, and also averaged across the countries. This improves the generalisability of the costing analyses. Discounting was appropriately not performed. In addition, the price year was not reported, which may hinder any future reflation exercises.

Other issues
The authors reported that this was the "first formal economic analysis of the potential economic impact of EUS for this indication and... the first study to compare the results internationally". Therefore, they were unable to compare their results with the findings of other authors. The issue of generalisability was addressed by the broad range of countries considered, and the reporting of costs on an individual and average basis. The authors' conclusions reflected the scope of the study and also the cost-minimisation design. Several limitations were recorded. For example, the external validity if the decision model did not adequately represent clinical realities, modelling assumptions, and the short time horizon of the study.

Implications of the study
The authors did not make any recommendations for policy or practice following their study, although they emphasised that the use of EUS would not necessarily achieve a goal of cost-minimising. The authors suggested further work to objectively measure the effectiveness of EUS and to determine whether EUS is "cost-effective".

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Other publications of related interest
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**MeSH**
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