

## ***Executive summary***

# **Systematic review of endoscopic ultrasound in gastro-oesophageal cancer**

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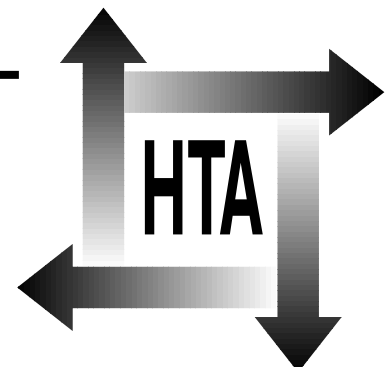
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**Health Technology Assessment  
NHS R&D HTA Programme**





## Executive summary

### Objectives

The aim was to review the literature relating to the use of endoscopic ultrasound for the preoperative staging of gastro-oesophageal cancer, especially regarding staging performance and staging impact. In addition, evidence was sought on the health economics, therapeutic impact and effect on patient outcome of endoscopic ultrasound in any clinical application.

### Methods

#### Data sources

Electronic searches of MEDLINE and BIDS ISI formed the basis of the literature search. Other electronic resources searched included the Cochrane Library, EMBASE, Inside Information Plus, SIGLE and FirstSearch. Bibliographic listings of all retrieved articles were handsearched. Additionally, authors of abstracts, leading centres of endoscopic ultrasound, manufacturers and an endoscopic ultrasound e-mail discussion group were contacted with a request for unpublished information.

#### Study selection and validation

Study selection was a three-stage process using predefined inclusion and exclusion criteria. Only English language papers were included. The paucity of randomised controlled trials necessitated the acceptance of evidence from other study designs. For literature on staging performance, validation studies against a gold standard were included if there were sufficient numbers of patients and raw data were presented. For these studies, investigation of the validity of the evidence included analysis of the effect of the presence of any of 20 potential biases and the equipment and imaging protocol used.

#### Data extraction

Data were extracted from the studies selected using data extraction forms. Numerical values of staging performance for the completion of  $2 \times 2$  contingency tables were extracted. Descriptive summaries were prepared for the other types of study where quantitative analysis was not feasible.

### Data synthesis

Staging performance results (sensitivity, specificity, positive predictive value, negative predictive value, accuracy and odds ratio) were synthesised and receiver operator characteristic curves for the differentiation of tumour Stages T1 and T2 from T3 and T4 plotted. A summary statistic ( $Q^*$ , balancing sensitivity and specificity) was read from the curve. Similar analysis for the discrimination of lymph node Stage N0 from N1 and above was performed.

Quantitative synthesis was not applicable for the studies of staging impact, therapeutic impact, patient outcome or health economics.

The robustness of the results was investigated by using regression techniques to incorporate bias risk and other factors (e.g. use of protocol) into the quantitative analysis.

### Results

- Twenty-seven primary studies addressing the performance of endoscopic ultrasound for the preoperative staging of gastro-oesophageal cancer satisfied the inclusion criteria.
- The performance of endoscopic ultrasound in T staging gastro-oesophageal cancer was  $Q^* = 0.91$ . For gastric T staging  $Q^* = 0.93$  and for oesophageal T staging  $Q^* = 0.89$ .
  - The value for  $Q^*$  was significantly ( $p < 0.05$ ) lower for studies performed in the 1990s than for those in the 1980s.
  - The presence of stenosis resulting in non-traversability was found slightly, but significantly ( $p < 0.05$ ), to reduce the staging performance of endoscopic ultrasound.
  - Radial probes performed better than linear probes in staging gastric cancer, although, in staging oesophageal cancer, there was no significant difference in the performance between probes.
- The performance of endoscopic ultrasound in N (lymph node) staging associated with gastro-oesophageal cancer was  $Q^* = 0.79$ . For N staging associated with gastric cancer this was  $Q^* = 0.76$  and for N staging associated with oesophageal cancer  $Q^* = 0.82$ .

- Studies that reported attempts to perform some form of blinding achieved a significantly ( $p < 0.05$ ) better performance compared with those that did not.
- Insufficient information for data synthesis was found on M staging (staging of metastases) and grouped TNM staging.
- There was insufficient information on the use of miniprobes (for subanalysing T1 tumours).
- There was little information about the use of fine-needle aspiration specifically applicable to gastro-oesophageal cancer.
- Eight studies compared the staging performance of endoscopic ultrasound with that of incremental computed tomography (CT), but the CT aspects of these were poorly performed and no measure of the staging impact of endoscopic ultrasound (EUS) could be determined.
- There was very little evidence regarding therapeutic impact, patient outcome and health economics.

## Conclusions

- EUS is highly effective for the discrimination of Stages T1 and T2 from T3 and T4, in both the oesophagus and the stomach.
- Initial indications are that the performance for T staging at the cardia is less good.
- Non-traversable stenosis does reduce the staging performance of EUS, but evidence on whether this reduction justifies the risk of dilatation was not available.
- The studies available on the use of miniprobes report a high performance for discrimination between mucosal and submucosal cancer. No evidence regarding the subsequent impact of these findings is available.
- Lymph node staging with EUS has a lower performance than that of tumour staging.
- Staging for metastases using EUS alone is not satisfactory.

## Recommendations

The following research recommendations were made by the authors:

- methodological research into the effect of searching only the major electronic databases and into factors that make publication bias less likely
- continued collaboration between reviewers in fields lacking randomised controlled trials regarding the assessment of study quality
- updating of this review, especially with regard to the proportion of non-traversable tumours encountered
- a study to determine the value of miniprobes prior to endoscopic mucosal resection
- well-designed studies, using the optimal protocols for both EUS and CT, to compare staging performance, which must also investigate the complementary use of the modalities
- further investigation of the use of fine-needle aspiration in gastro-oesophageal cancer in a study concentrating on lymph nodes
- retrospective studies to confirm the limited learning curve data currently available
- new studies, specifically designed to measure staging impact, therapeutic impact and patient outcome, because evidence in these areas is not currently available
- use of decision-modelling techniques to combine outcome and cost data from the new studies and other sources
- encouragement of imaging scientists both to perform better designed studies and to ensure that descriptions published in the literature are comprehensive.

## Publication

Harris KM, Kelly S, Berry E, Hutton J, Roderick P, Cullingworth J, et al. Systematic review of endoscopic ultrasound in gastro-oesophageal cancer. *Health Technol Assess* 1998; **2**(18).

# NHS R&D HTA Programme

The overall aim of the NHS R&D Health Technology Assessment (HTA) programme is to ensure that high-quality research information on the costs, effectiveness and broader impact of health technologies is produced in the most efficient way for those who use, manage and work in the NHS. Research is undertaken in those areas where the evidence will lead to the greatest benefits to patients, either through improved patient outcomes or the most efficient use of NHS resources.

The Standing Group on Health Technology advises on national priorities for health technology assessment. Six advisory panels assist the Standing Group in identifying and prioritising projects. These priorities are then considered by the HTA Commissioning Board supported by the National Coordinating Centre for HTA (NCCHTA).

This report is one of a series covering acute care, diagnostics and imaging, methodology, pharmaceuticals, population screening, and primary and community care. It was identified as a priority by the Diagnostics and Imaging Panel and funded as project number 94/44/03.

The views expressed in this publication are those of the authors and not necessarily those of the Standing Group, the Commissioning Board, the Panel members or the Department of Health. The editors wish to emphasise that funding and publication of this research by the NHS should not be taken as implicit support for the recommendations for policy contained herein. In particular, policy options in the area of screening will, in England, be considered by the National Screening Committee. This Committee, chaired by the Chief Medical Officer, will take into account the views expressed here, further available evidence and other relevant considerations.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search, appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

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The editors have tried to ensure the accuracy of this report but cannot accept responsibility for any errors or omissions. They would like to thank the referees for their constructive comments on the draft document.

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