Economic analysis of esophageal stenting for management of malignant dysphagia

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 covered versus uncovered self-expanding metal stents (SEMS) for the palliation of malignant dysphagia in patients with oesophageal cancer. Future research was also evaluated. Covered SEMS were cost-effective compared with both uncovered SEMS and plastic stents from the UK National Health Service perspective. The study was well conducted and, despite some limited reporting on the clinical data, the issue of uncertainty was extensively and appropriately investigated, which enhances the validity of the authors’ conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of covered versus uncovered self-expanding metal stents (SEMS) for malignant dysphagia in patients with oesophageal cancer. The analysis also investigated the expected value of further research to reduce uncertainty.

Interventions
SEMS covered with a polyurethane or silicone layer were compared with uncovered SEMS and with plastic stents.

Location/setting
UK/hospital.

Methods
Analytical approach:
This economic evaluation was based on a decision tree model with a one-year time horizon. The authors stated that the analysis was carried out from the perspective of the UK National Health Service (NHS).

Effectiveness data:
The clinical data were derived from a published meta-analysis, which included one randomised controlled trial and six non-randomised retrospective studies. No further details were provided. The key clinical endpoint was 30-day mortality, which was the weighted mean of the studies included in the meta-analysis, for uncovered stents, and derived from this using the odds ratios, for covered and plastic stents.

Monetary benefit and utility valuations:
The data on health-related quality of life (HRQoL) associated with malignant dysphagia were obtained from two published studies, the details of which were not given. Disutilities were associated with the interventions for patients receiving stents. Some of the details of the calculation of the utility values were reported.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure.

Cost data:
The economic analysis considered the costs of hospital stay, stents, and therapeutic endoscopic procedure. The costs of complications of stents were excluded. The costs of stents came directly from the manufacturer. The cost of endoscopy and hospital stay was based on published NHS reference costs. Resource use data on the length of hospital stay were derived from the published meta-analysis. All costs were reported in US dollars ($) and the price year was not reported.
Analysis of uncertainty:
A probabilistic sensitivity analysis was carried out, with 1,000 Monte Carlo iterations and triangular distributions for the model inputs based on published confidence intervals (CIs). The population expected value of perfect information (EVPI) was calculated. An alternative analysis used historical prices of stents from previous economic evaluations, to allow easy comparisons.

Results
The expected QALYs were 0.3324 (standard deviation, SD: 0.0234) with plastic stent, 0.3522 (SD: 0.0231) with uncovered SEMS, and 0.3535 (SD: 0.0234) with covered SEMS. The expected NHS costs were $8,058.92 (SD: 1,614.59) with plastic stents, $5,226.27 (SD: 875.23) with uncovered stents, and $4,498.69 (SD: 688.30) with a covered stent. Thus, covered SEMS were the dominant strategy because they were both less expensive and more effective than the comparators.

When using historical prices, plastic stents were still more expensive than uncovered and covered SEMS.

The probabilistic analysis showed that the probability of covered SEMS being more cost-effective than uncovered SEMS was greater than 97% at a willingness-to-pay threshold of $200,000 per QALY. The probability of both types of SEMS being more cost-effective than plastic stents was greater than 99% at a threshold of $150,000 per QALY.

The population EVPI suggested that the maximum value of further research was $61,124.30.

Authors’ conclusions
The authors concluded that covered SEMS were a cost-effective alternative to both uncovered SEMS and plastic stents, from the perspective of the UK NHS. Furthermore, the EVPI suggested that further research might not be cost-effective. These findings supported the national guidelines for the management of malignant dysphagia.

CRD commentary
Interventions:
The selection of the comparators was appropriate as they were the available technologies for this patient population.

Effectiveness/benefits:
The authors provided little information on the source of clinical evidence because it was a published study. A meta-analysis ensures the use of a rigorous methodology to derive the clinical data. One randomised trial and six non-randomised retrospective studies were included, due to a lack of high-quality studies. More detail would have been useful to judge the validity of the clinical estimates. Information on the derivation of the utility valuations was reported, but the approach used to elicit the preferences for health conditions in the primary sources of data was not described. Some utility values were derived from patient populations that might not have been similar to the one in this study. QALYs are a validated and appropriate benefit measure given the strong impact of the disease on both quality of life and survival.

Costs:
The economic analysis was carried out in accordance with UK guidelines. The types of costs reflected the perspective. The costs of treatment of complications associated with palliative stents were not formally included, but were implicitly taken into account in the length of hospital stay and the re-intervention rate. The sources of data were reported and were appropriately selected. An alternative source for the device price was used for comparison with other studies. In general, the economic analysis appears to have been well conducted. Although the price year was not explicitly reported, the final references suggest that it was 2006 to 2007.

Analysis and results:
The findings were clearly presented. The issue of uncertainty was extensively and appropriately addressed, which was a strength of this economic evaluation. The exhaustive sensitivity analysis helps overcome the potential drawbacks associated with the use of data from multiple sources. A synthesis of the costs and benefits was not required given the superior profile of covered SEMS over its comparators. The authors stated that the study was explicitly biased in favour of plastic stents. For example, the potential improvement in utility due to improved dysphagia symptoms was not
considered and its inclusion would have favoured the covered and uncovered metal stents. The relatively short time horizon was due to the poor prognosis of this patient population.

**Concluding remarks:**
The study was well conducted and, despite some limited reporting on the clinical side, the issue of uncertainty was extensively and appropriately investigated. This enhances the validity of the authors’ conclusions.

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