

A Cost-Effectiveness Analysis For Endoscopic Therapy in the Treatment of Patients with Barrett's Oesophagus-Related Neoplasia in the United Kingdom

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BACKGROUND AND OBJECTIVES

High grade dysplasia (HGD) arising in patients with Barrett's oesophagus (BE) carries a significant risk of progression to invasive cancer which carries a poor prognosis. UK BSG guidelines advocate the use of endoscopic therapy for these patients. Current clinical recommendations are to treat BE patients with HGD with endoscopic eradication therapy (EET) before cancer develops. However, the 2015 National Oesophago-Gastric Cancer Audit identified that over a quarter of patients with HGD were managed with surveillance alone.

The aim of this study was to evaluate the cost-effectiveness of endoscopic therapy with endoscopic mucosal resection (EMR) followed by radiofrequency ablation (RFA) for the treatment of HGD arising in patients with BE compared with no treatment with surveillance alone in the United Kingdom (UK).

METHODS

The economic model was developed from the perspective of the National Health Service (NHS) and personal social services (PSS). The model adopted a lifetime time horizon to account for all important costs and benefits; annual discount rates of 3.5% were applied to costs and benefits, as per the NICE reference case [1]. An annual cycle length was used in the model. A hypothetical cohort of Barrett's Oesophagus patients (mean age: 62) following an initial diagnosis of HGD was modelled. In the intervention (RFA) arm, patients with HGD were treated with EMR (for 65% of cases) plus RFA. In the UK Registry approximately 60% of patients have EMR prior to RFA for BE neoplasia. In the comparator arm, patients with HGD received surveillance only.

In both arms, patients with NDBE or LGD were assumed to have surveillance and patients progressing to OAC were assumed to have an oesophagectomy.

The model structure consists of an initial decision tree, in which patients in the treatment arm were assumed to have RFA treatment. This determines which health state they moved into in the Markov component. After initial treatment all patients enter the natural history Markov model. Patients could move between health states as shown in the diagram (NDBE, LGD, HGD and OAC). Cost inputs were taken from standard sources. Effectiveness input parameters are outlined in Table 1.

Figure 1: Model structure

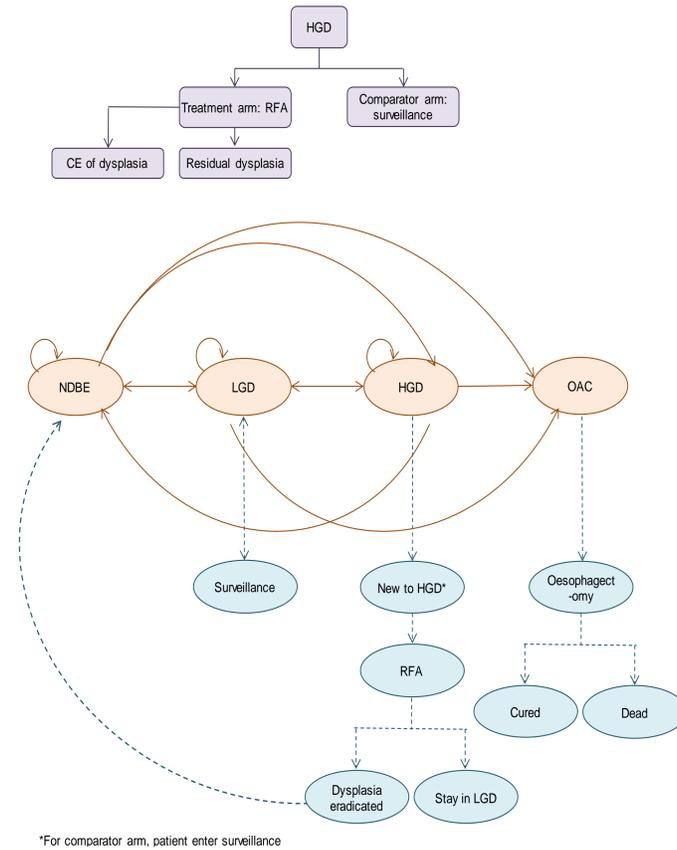


Table 1: Effectiveness input parameters

Parameter	Input	Source
Success of RFA for HGD: Complete eradication	92.6%	[2]
Success of RFA for HGD: Residual dysplasia	7.4%	[2]
Natural history transition probability	See source for full matrix	[3]
Utilities	Range from 0.48 to 0.80	[4, 5]

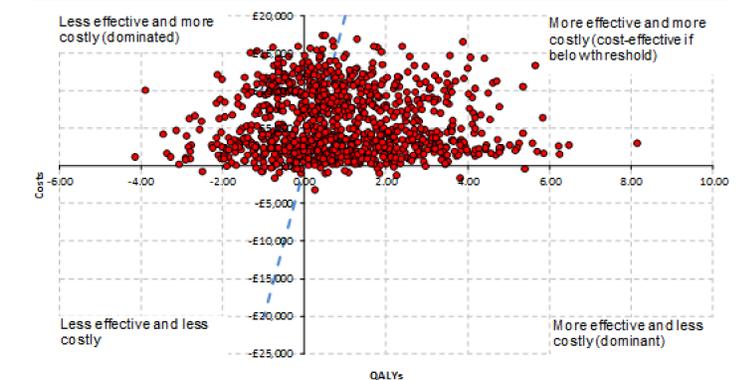
RESULTS

The model estimates that EMR plus RFA for HGD patients is cost-effective at a £20,000 cost-effectiveness threshold (below which an intervention is considered to be 'cost-effective') compared with only providing surveillance for HGD patients. The results show that, although there are additional costs associated with RFA (mainly due to the cost of implementing RFA) at a 30 year time horizon, the QALYs accrued offset this additional cost with an estimated ICER of £3,980. This translates to a net health benefit of almost 0.78 QALYs. Univariate sensitivity analysis highlighted the greatest cause of uncertainty to be the natural history inputs [3]. Probabilistic sensitivity analysis (PSA) showed that 61% of iterations were cost-effective using a £20,000 threshold, and 66% using a £30,000 threshold.

Table 2: Results at 30 years

	Treatment (EMR + RFA)	Comparator	Incremental
Cost of RFA	£6,365	£0	£6,365
Cost in NDBE	£2,735	£41	£2,694
Cost in LGD	£1,074	£357	£718
Cost in HGD	£70	£5,442	-£5,372
Cost in OAC	£573	£1,079	-£506
Total cost	£10,817	£6,918	£3,899
Total QALYs	10.041	9.062	0.979
Incremental cost-effectiveness ratio (ICER)			£3,980
Net health benefit (NHB)			0.78

Figure 2: Results at 30 years



CONCLUSIONS

Our analysis estimated that treating Barrett's oesophagus patients with HGD with endoscopic therapy compared with surveillance alone is cost-effective from a UK healthcare perspective. The results are in line with the findings of previous similar studies [3, 6, 7]. However, to our knowledge, this is the first UK study to evaluate the cost-effectiveness of EET vs surveillance in a cohort of HGD patients. This study aims to reflect current recommendations for treating HGD with endoscopic therapy [8] and address the gap identified in the 2015 National Oesophago-Gastric Cancer Audit [9] which identified that over a quarter of patients with HGD were managed with surveillance alone.

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