The cost-effectiveness of screening for oral cancer in primary care

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Executive summary

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Executive summary

Objectives

The objectives were to use a decision-analytic model to determine the incremental costs and outcomes of alternative oral cancer screening programmes conducted in a primary care environment. The following specific questions were addressed:

- What are the actual costs of screening for oral cancer and precancer in primary care settings?
- What are the actual costs of management of oral precancerous lesions and oral cancer, including costs of recurrent disease, long-term rehabilitation and palliation?
- What screening programmes in primary care may be cost-effective in terms of survival (life years gained) and overall gains in quality-adjusted life-years (QALYs)?
- What are the future research priorities? Specifically, what is the expected value of perfect information (EVPI) for the decision to adopt a screening programme and for each of the model inputs?

Design

The cost-effectiveness of oral cancer screening programmes in a number of primary care environments was simulated using a decision analysis model. Primary data on actual resource use and costs were collected by case note review in two hospitals. Additional data needed to inform the model were obtained from published costs, from systematic reviews and by expert opinion using the Trial Roulette approach. The value of future research was determined using EVPI for the decision to screen and for each of the model inputs.

Setting

Hypothetical screening programmes conducted in a number of primary care settings. Eight strategies were compared:

A no screen
B invitational screen – general medical practice
C invitational screen – general dental practice
D opportunistic screen – general medical practice
E opportunistic screen – general dental practice
F opportunistic high-risk screen – general medical practice
G opportunistic high-risk screen – general dental practice
H invitational screen – specialist.

Participants

A hypothetical population over the age of 40 years was studied.

Main outcome measures

The main measures were mean lifetime costs and QALYs of each alternative screening scenario and incremental cost-effectiveness ratios (ICERs) to determine the additional costs and benefits of each strategy over another.

Results

Cost-effectiveness

No screening (strategy A) was always the cheapest option. Strategies B, C, E and H were never cost-effective and were ruled out by dominance or extended dominance. Of the remaining strategies, the ICER for the whole population (age 49–79 years) ranged from £15,790 to £25,961 per QALY. Modelling a 20% reduction in disease progression always gave the lowest ICERs. Cost-effectiveness acceptability curves showed that there is considerable uncertainty in the optimal decision identified by the ICER, depending on both the maximum amount that the NHS may be prepared to pay and the impact that treatment has on the annual malignancy transformation rate. Overall, however, high-risk opportunistic screening by a general dental or medical practitioner (strategies F and G) may be cost-effective.

Expected value of perfect information analysis

EVPIs were high for all parameters with population values ranging from £8 million to £462 million. However, the values were

significantly higher in males than females but also varied depending on malignant transformation rate, effects of treatment and willingness to pay. Partial EVPIs showed the highest values for malignant transformation rate, disease progression, self-referral and costs of cancer treatment.

Discussion

Set against a benchmark figure of £20,000–30,000 per QALY, the results indicate that opportunistic screening for oral cancer may be cost-effective. In particular, opportunistic high-risk screening by general dental practitioners, who are already trained to examine the mouth, with an ICER of £18,919 may be a practical proposition. These data, however, assume that interventive treatment of precancerous lesions will prevent disease progression and reduce the malignant transformation rate. Literature reviews revealed that there is little evidence that this is the case. EVPI analysis showed considerable uncertainty around the parameters used in the model, but identified that potential future research would be of most value directed at more precise determination of malignant transformation rates.

Conclusions

Opportunistic high-risk screening, particularly in general dental practice, may be cost-effective. Screening may more effectively be targeted to younger age groups, particularly those aged between 40–60 years. However, there is considerable uncertainty in the parameters used in the model, particularly malignant transformation rate, disease progression, patterns of self-referral and costs.

Recommendations for further research

Studies are needed to determine the malignant transformation rates and the outcome of treatment of oral potentially malignant lesions. Evidence has been published to suggest that intervention has no greater benefit than 'watch and wait'. Hence a properly planned randomised controlled trial may be justified.

Studies are also needed to determine the rates of progression of oral cancers as well as on referral pathways from primary to secondary care and their effects on delay and stage of presentation.

The decision model should be run on data obtained from sources with less heterogeneity or uncertainty in the data.

Publication

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NHS R&D HTA Programme

The research findings from the NHS R&D Health Technology Assessment (HTA) Programme directly influence key decision-making bodies such as the National Institute for Health and Clinical Excellence (NICE) and the National Screening Committee (NSC) who rely on HTA outputs to help raise standards of care. HTA findings also help to improve the quality of the service in the NHS indirectly in that they form a key component of the 'National Knowledge Service' that is being developed to improve the evidence of clinical practice throughout the NHS.

The HTA Programme was set up in 1993. Its role 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 provide care in the NHS. 'Health technologies' are broadly defined to include all interventions used to promote health, prevent and treat disease, and improve rehabilitation and long-term care, rather than settings of care.

The HTA Programme commissions research only on topics where it has identified key gaps in the evidence needed by the NHS. Suggestions for topics are actively sought from people working in the NHS, the public, service-users groups and professional bodies such as Royal Colleges and NHS Trusts.

Research suggestions are carefully considered by panels of independent experts (including service users) whose advice results in a ranked list of recommended research priorities. The HTA Programme then commissions the research team best suited to undertake the work, in the manner most appropriate to find the relevant answers. Some projects may take only months, others need several years to answer the research questions adequately. They may involve synthesising existing evidence or conducting a trial to produce new evidence where none currently exists.

Additionally, through its Technology Assessment Report (TAR) call-off contract, the HTA Programme is able to commission bespoke reports, principally for NICE, but also for other policy customers, such as a National Clinical Director. TARs bring together evidence on key aspects of the use of specific technologies and usually have to be completed within a short time period.

Criteria for inclusion in the HTA monograph series
Reports are published in the HTA monograph series if (1) they have resulted from work commissioned for the HTA Programme, and (2) they are of a sufficiently high scientific quality as assessed by the referees and editors.

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.

The research reported in this monograph was commissioned by the HTA Programme as project number 99/46/02. The contractual start date was in September 2001. The draft report began editorial review in April 2004 and was accepted for publication in July 2005. As the funder, by devising a commissioning brief, the HTA Programme specified the research question and study design. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HTA editors and publisher have tried to ensure the accuracy of the authors' report and would like to thank the referees for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

The views expressed in this publication are those of the authors and not necessarily those of the HTA Programme or the Department of Health.

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