Cost effectiveness of varenicline versus bupropion and unaided cessation for smoking cessation in a cohort of Finnish adult smokers

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
The objective was to assess the cost-effectiveness of varenicline compared with bupropion or no aid for smoking cessation in Finland. The authors concluded that varenicline was more effective and resulted in cost savings compared with bupropion or unaided cessation. The methods appear to have been satisfactory, but the authors' conclusions did not account for the considerable uncertainty in the results.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of varenicline compared with bupropion or no aid for smoking cessation in Finland.

Interventions
The smoking cessation interventions were: none; bupropion for seven weeks; and varenicline for 12 weeks.

Location/setting
Finland/primary care.

Methods
Analytical approach:
The authors used the BENEfits of Smoking Cessation on Outcomes (BENESCO) model to simulate the health economic consequences for a hypothetical cohort of smokers. The BENESCO model was a Markov state-transition model, which was published by the National Institute for Health and Clinical Excellence (Hind, et al. 2007, see 'Other Publications of Related Interest' below for bibliographic details). The time horizon was the lifetime of the patient and the authors reported that a societal perspective was adopted.

Effectiveness data:
The clinical and effectiveness estimates were from a wide variety of published sources including: randomised trials, cohort studies, health surveys, life tables, and other published studies. The main effectiveness estimate was the one-year continuous abstinence rate. These data were derived from two head-to-head randomised trials, with identical designs.

Monetary benefit and utility valuations:
The utility estimates were obtained using the 15-dimension health-related quality of life (15D) questionnaire, with the Finnish general population.

Measure of benefit:
Life-years and quality-adjusted life-years (QALYs) gained were the benefit measures and they were discounted at an annual rate of 5%.

Cost data:
The costs included those of treatment of coronary heart disease and stroke, which included the costs of out-patient visits, in-patient stays, diagnostic tests, procedures, support services, and medications; treatment of pulmonary diseases;
and intervention costs for varenicline and bupropion, which included physician visits and pharmacotherapy. The resource use and unit costs were from drug reimbursement schedules, published Finnish studies, and hospital databases. Productivity costs were not included. Future costs were discounted at an annual rate of 5%. The price year was 2006 to 2007 and costs were updated using the health care component of the Finnish cost of living index. All costs were reported in Euros (EUR).

Analysis of uncertainty:
A series of one- and two-way sensitivity analyses was undertaken to assess how robust the base-case results were. A probabilistic sensitivity analysis was also undertaken by fitting the key parameters with probability distributions and sampling them for 1,000 simulations. The results of this analysis were presented in cost-effectiveness acceptability curves.

Results
The total life-years gained in Finland were 4,486,164 with varenicline, 4,481,772 with bupropion, and 4,474,861 with no aid. The total QALYs gained were 4,161,579 with varenicline, 4,156,728 with bupropion, and 4,149,094 with no aid. The total costs were EUR 5,170,773,916 with varenicline, EUR 5,185,427,331 with bupropion, and EUR 5,213,398,246 with no aid.

Varenicline was dominant, as it was less costly and more effective, compared with bupropion or unaided cessation.

The results of the probabilistic sensitivity analysis showed that the probability of varenicline being cost-effective at a threshold of EUR 10,000 per QALY gained was 65% compared with bupropion and 80% compared with unaided cessation.

Authors' conclusions
The authors concluded that varenicline was more effective and resulted in cost savings compared with bupropion or unaided cessation.

CRD commentary
Interventions:
The interventions were clearly reported, but there might have been other relevant alternatives that could also have been included.

Effectiveness/benefits:
The clinical and effectiveness data were from a wide variety of sources. Brief details of these sources were given for each of the model parameters, but the way that they were identified was not reported. The description of the clinical studies used to provide the efficacy estimates was limited and it is not clear if the best available evidence was used. The model had been used and validated in other studies, which were referenced. From the details reported, it was not possible to determine if all relevant clinical studies were used to inform the other clinical estimates. The main measure of effectiveness was derived from randomised controlled trials, which are the gold-standard design for assessing health interventions. The measure of benefit, QALYs, was appropriate and the utilities were relevant to the study population.

Costs:
The authors reported that a societal perspective was adopted, but productivity costs were not included, which means that a health care system perspective was adopted. All the relevant major costs appear to have been included for the health care system perspective. The sources from which some of the unit costs and resource use were derived were reported, but it was not clear if these costs corresponded to the resource use in the clinical trials used to supply the clinical effectiveness data. The authors did not describe how they estimated the costs of treatment of chronic obstructive pulmonary disease, lung cancer, coronary heart disease, stroke, or severe asthma exacerbations beyond one year. The time horizon, discount rate, and price year were all reported.

Analysis and results:
The clinical and cost data were synthesised using a Markov model, which had been published and validated in a number of studies. Appropriate details of this model were given, including a diagram. The impact of uncertainty on the model's
results was evaluated, using a series of one-way and probabilistic sensitivity analyses. The authors reported some limitations to their study, which were that additional smoking-related diseases and the effects of passive smoking were not included and that the model assumed that smokers only attempted to quit once in their lifetime.

Concluding remarks:
The methods appear to have been satisfactory, but the description of the effectiveness sources was limited. The authors' conclusions did not account for the considerable uncertainty found in the probabilistic sensitivity analysis.

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