Y O R K
Health Economics
C O N S O R T I U M

NICE

Cost-Effectiveness of Interventions for Smoking Cessation

Final Report

November 2021: NICE guideline PH5 (April 2007) has been updated and replaced by NG209.

The recommendations labelled [2007] or [2007, amended 2021] in the updated guideline were based on these evidence reviews.

See www.nice.org.uk/guidance/NG209 for all the current recommendations and evidence reviews.

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Executive Summary

1. INTRODUCTION AND METHODS

The National Institute for Health and Clinical Excellence (NICE) has commissioned a series of Rapid Reviews and the development of an economic model for the evaluation of smoking cessation treatments. This information will be used to identify and facilitate the optimal provision of smoking cessation services to all smokers. It is intended that the Rapid Reviews will provide some of the data required for the construction of the economic model.

The aim of this study was to determine the cost-effectiveness of smoking cessation interventions delivered in the workplace, by the NHS and by the mass media.

A hypothetical cohort of 1,000 smokers was modelled in six-monthly cycles over their lifetime. In every cycle smokers can either quit (i.e. become 'former smokers'), remain smokers or die. Former smokers can either relapse (i.e. become smokers), remain former smokers or die.

Each six-month cycle, smokers and former smokers have a chance of five distinct co-morbidities:

- Lung cancer;
- Coronary heart disease (CHD);
- Chronic obstructive pulmonary disease (COPD);
- Myocardial infarction (MI);
- Stroke.

The likelihood of any given individual in the cohort developing one or more of these disease changes with each cycle as their age changes and the probability of being a smoker, former smoker or non-smoker changes.

Each co-morbidity has an associated cost and utility (these were based on published data and full details will be provided in the final report). Each cycle, the number of people with each co-morbidity was multiplied by the associated cost and utility. Where someone had more than one co-morbidity, the lowest utility was applied. This enabled the total cost and QALYs of each intervention to be compared to 'no intervention' and the incremental cost-effectiveness (ICER) to be calculated. Each intervention was modelled using three scenarios where:

- The quit rate is the same as the background cessation rate after one year;
- The quit rate is the same as the background cessation rate after two years;
- The quit rate is the same as the background cessation rate after five years.

2. RESULTS AND CONCLUSIONS

Table 2.1 provides a summary of the main results, where all interventions are compared to 'no intervention'. All interventions lead to a reduction in the number of smokers, fewer co-morbidities and more QALYs compared to 'no intervention'. The 'brief advice' ('BA'), 'BA

plus self-help material' and 'BA plus self-help material plus NRT plus specialist clinic', 'LIC and bupropion' and 'MIC and bupropion' interventions result in lower costs than 'no intervention', for all scenarios.

'Advice plus self help material plus NRT' has a high cessation rate. If the cessation rate is not maintained after one year the intervention is more costly than 'do nothing'. However, even in the worst case scenario the ICER is only £1,080.

The net financial benefit column in the table considers the impact to the employer by subtracting the cost of providing the intervention from the benefits in terms of productivity gains (arising from reduced absenteeism). As such, a positive net financial benefit suggests that the benefits of the intervention outweigh the costs to the employer.

'BA', and 'BA plus self-help material' result in a positive net financial benefit when the cessation rate is maintained for five years or more, due to the very small cost of the intervention. Because of the higher intervention costs, the following interventions 'advice plus self-help plus NRT', 'advice plus smoking cessation services', 'LIC and bupropion' and 'MIC and bupropion' are more difficult to justify to employers, with the interventions only showing a positive impact for the employer when the cessation rate is maintained over two or five years.

Table 2.1: Summary results

Compared to 'no intervention'	Effectiveness	Duration of intervention	Inc. cost	Inc. QALY	ICER	Net financial benefit*		
						One year	Five years	Lifetime
'BA'								
Quit rate = baseline after one year	3%	Three minutes of a GPs time.	-£11	0.01	Dominant	-£5	£5	£27
Quit rate = baseline after two years			-£27	0.02	Dominant	-£5	£14	£59
Quit rate = baseline after five years			-£70	0.04	Dominant	-£5	£26	£135
'BA plus self-help material'								
Quit rate = baseline after one year	4%	Four minutes of a GPs time; Self-help material.	-£25	0.02	Dominant	-£6	£14	£58
Quit rate = baseline after two years			-£57	0.03	Dominant	-£6	£32	£120
Quit rate = baseline after five years			-£141	0.07	Dominant	-£6	£55	£269
'BA plus self help material plus NRT'								
Quit rate = baseline after one year	6%	Seven minutes of a GPs time; Self-help material; NRT.	£38	0.04	£1,080	-£102	-£62	£27
Quit rate = baseline after two years			-£26	0.07	Dominant	-£102	-£26	£148
Quit rate = baseline after five years			-£182	0.14	Dominant	-£102	£17	£428
'BA plus self-help material plus NRT plus specialist clinic'								
Quit rate = baseline after one year	15%	Four minutes of a GPs time; Self-help material; NRT; Clinic costs.	-£109	0.11	Dominant	-£93	£37	£326
Quit rate = baseline after two years			-£297	0.21	Dominant	-£93	£142	£682
Quit rate = baseline after five years			-£677	0.39	Dominant	-£93	£252	£1,362
'LIC and bupropion'								
Quit rate = baseline after one year	24%	8 weeks of bupropion; self-help material; 5-10min scripted call.	-£309	0.19	Dominant	£50	£266	£746
Quit rate = baseline after two years			-£589	0.33	Dominant	£50	£423	£1,278
Quit rate = baseline after five years			-£1,057	0.55	Dominant	£50	£564	£2,117
'MIC and bupropion'								
Quit rate = baseline after one year	31%	8 weeks of bupropion; self-help material, five calls with smoking specialist.	-£430	0.26	Dominant	£50	£362	£1,017
Quit rate = baseline after two years			-£773	0.43	Dominant	£50	£555	£1,667
Quit rate = baseline after five years			-£1,246	0.65	Dominant	£297	£703	£2,517

* The net financial benefit considers the impact to the employer by subtracting the cost of providing the intervention from the benefits in terms of productivity gains. As such, a positive net financial benefit suggests that the benefits of the intervention outweigh the costs to the employer.

3. MAIN FINDINGS AND CONCLUSIONS

This analysis considers five interventions, each run using three scenarios. Interventions that have a low cost and a low cessation rate dominate ‘no intervention’. Interventions with a higher cost and high cessation rate only dominate ‘no intervention’ if the cessation rate is maintained beyond the duration of the intervention. However, under all scenarios, the cost per QALY of each of the interventions was low (maximum = £1,080).

The ‘MIC and bupropion’ intervention is the cheapest and the most effective intervention and therefore assuming that the interventions are mutually exclusive it dominates all the other interventions.

Acknowledgements

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Section 1: Introduction

1.1 BACKGROUND

The National Institute for Health and Clinical Excellence (NICE) has commissioned a series of Rapid Reviews and the development of an economic model for the evaluation of smoking cessation treatments. These will be used to identify and facilitate the optimal provision of smoking cessation services to all smokers. It is intended that the Rapid Reviews will provide some of the key data needed for the construction of the economic model.

Smoking is linked to many health related problems including an increased risk of cancer, heart disease, digestive problems, dementia, stomach/duodenal ulcer, impotence and infertility. It is also linked with complications of pregnancy and low birth weight, osteoporosis, cataracts, age-related muscle degeneration, peridontitis, lower survival rates after surgery, delayed wound healing and postoperative respiratory complications [1]. Approximately 80% to 90% of chronic obstructive pulmonary disease (COPD) is caused by smoking [2]. There is also a 50% chance that a smoker will be dead before the age of 65 [1]. It is estimated that, between 1998 and 2002, smoking led to an estimated annual average of 86,500 deaths, with 62% of these among men [3].

Smoking not only affects the smoker but also those around them [4]. In the short term, passive smoking can exacerbate respiratory symptoms and trigger asthma attacks [4]. In the longer term it can increase the risk of lung cancer, respiratory illness, heart disease and stroke [4].

The economic consequences of smoking to the National Health Service (NHS) are estimated to be £1.5 billion each year. This is as a result of treating the diseases caused by smoking [5].

The NHS provides services to assist smokers who wish to quit. The services on offer include the provision of counselling and support to smokers who want to quit and the provision of stop smoking aids such as nicotine replacement therapy (NRT) and bupropion [6]. Additional assistance is provided for pregnant women smokers. This assistance includes liaising with primary care workers to ensure appropriate referrals are made, providing intervention at an early stage, and providing appropriate training for midwifes [7].

There is evidence that smoking cessation services work. For example, the *Statistics on NHS Stop Smoking Services in England, April 2004 to March 2005* reported that around 56% of those who had set a quit date during April 2004 to March 2005 had quit. The Rapid Review on NHS stop smoking services found a number of papers who assessed the English smoking cessation services. Godfrey *et al.* 2005 [8] investigated the cost-effectiveness of 58 English specialist smoking cessation services using a postal survey in 2001. Godfrey was able to show that the mean 12-month quit rate, after adjustment for background cessation,

was 12%. The total average service cost for the 58 services was £254,400, or £123 per person setting a quit date.

Stapleton 2001 [9] carried out an economic analysis to determine the cost-effectiveness of the NHS stop smoking services for the period from April 2000 to March 2001. The analysis was based on the 126,800 smokers who made a quit attempt while attending cessation services, 48% of whom were abstinent at four weeks. The cost of the NHS smoking cessation service was £21.4m, including the start-up and monitoring costs. Excluding these costs (start-up and monitoring) the cost per patient treated was £169. The cost was raised to £209 when five to six weeks of medication (NRT/bupropion) was included. The author show that at 12-months there was a net improvement in cessation of 17% where it was assumed that between 60% and 65% (author's assumption) of the four-week successes will have relapsed by month 12.

1.2 AIMS OF THE STUDY

The aim of the study is to determine the cost-effectiveness of smoking cessation interventions delivered:

- In the workplace;
- By the NHS;
- By the mass media.

The model is described in the next section (Section 2), Section 3 details the results of the analysis, and Section 4 provides a discussion of the findings and limitations.

Section 2: Methods

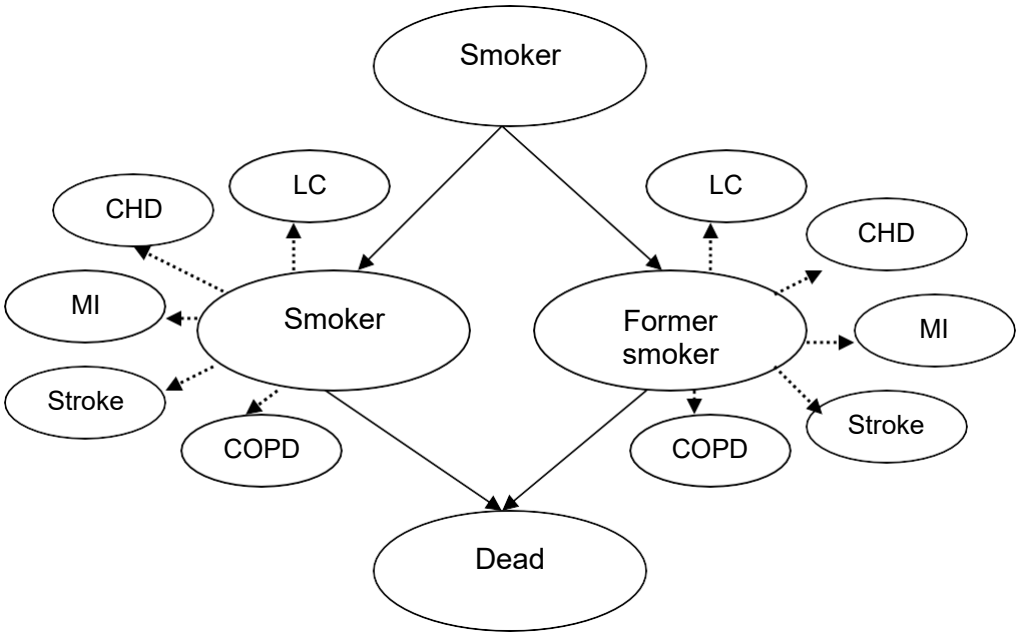
2.1 INTRODUCTION

A cohort simulation model was designed to estimate the costs and quality-adjusted life years (QALYs) associated with smoking cessation. The model has been designed to compare different smoking cessation interventions to determine their incremental cost-effectiveness. The interventions that were investigated are:

- 'No intervention';
- 'Brief advice' (BA);
- 'BA plus self-help material';
- 'BA plus self help material plus NRT';
- 'BA plus self-help material plus NRT plus specialist clinic';
- 'Counsellor and bupropion'.

A hypothetical cohort of 1,000 smokers was modelled in six-monthly cycles over their lifetime. In each cycle, smokers could either quit (become former smokers), remain smokers or die; and former smokers could either relapse (become smokers), remain former smokers or die (see Figure 2.1). Lack of data on former smokers did not allow a split into 'recent' and 'long-term' quitters. For example, data would be required on the relative risk of having each co-morbidity by smoking status with former smokers split into recent and long-term quitters.

Figure 2.1: Movement between health states (note that a smoker can have more than one co-morbidity)



Each cycle, smokers and former smokers have a chance of five co-morbidities included:

- Lung cancer;
- Coronary heart disease (CHD);
- COPD;
- Myocardial infarction (MI);
- Stroke.

To calculate the number of people, in each cycle, with each co-morbidity the number of smokers/former smokers was multiplied by smoking status related prevalence. For example, to calculate the number of smokers with lung cancer.

- The number of smokers in each cycle was multiplied by the prevalence of smoking related lung cancer.

The prevalence according to smoking status was multiplied by the number of smokers/former smokers to calculate the number of people with each co-morbidity in each cycle. Prevalence was assumed to be dependent on age and gender only in the model. Section 2.3.3 provides an explanation of how smoking dependent prevalence was calculated.

The likelihood of any given individual in the cohort developing one or more of these disease changes with each cycle as their age changes and the probability of being a smoker, former smoker or non-smoker changes.

Each co-morbidity has an associated cost and utility. To enable the total costs and utilities of the interventions to be compared with 'no intervention' the number of people with each co-morbidity was multiplied by the associated cost/utility of that co-morbidity, each cycle. This resulted in a total cost/utility for each co-morbidity, to calculate an overall total cost/utility these were summed together.

2.2 STUDY POPULATION

The model was undertaken using a 'population cohort' approach. The cohort was representative of all adults (i.e. age 16+) in the general population. That is, they are not representative of all adult smokers. It would, in theory, be possible to weight the cohort for other socio-demographic characteristics, but data would be required for all other parameters by these values (i.e. rates of complications, co-morbidities, smoking status, etc). The cost and QALY outcomes for each combination of age and gender were estimated (i.e. a 16 year old man, a 16 year old woman, a 17 year old man, a 17 year old woman, etc.). Weights were then applied to each of these groups, to ensure that the cohort was representative of the whole population. Population weights were derived from population estimates provided by the Office for National Statistics [10], see Appendix A. The costs and QALY outcomes for each age-gender group were then multiplied by these weights to provide total outcomes that were representative of the chosen population.

2.3 DATA

2.3.1 Literature Search

Electronic databases (Medline and PubMed), the Worldwide Web and references listed in identified articles were searched for relevant studies. Where there were any gaps, the Centre for Reviews and Dissemination (CRD) carried out further searches (the details of which are provided in Appendix B). Data were required for the following areas:

- Mortality, by age gender and smoking status;
- Prevalence of each co-morbidity, by age gender and smoking status;
- Utilities, for each co-morbidity;
- Costs, for each co-morbidity;
- The annual cessation and cost of each intervention modelled.

2.3.2 Mortality

The mortality rates from Doll *et al.* 1994 [11] were adjusted to reflect the general population mortality rates[1]. To adjust the mortality to reflect that found in the general population (see Appendix C [13]) the mortality per 1,000 men, by age band, was taken from the Doll study

[1] Although a more recent paper has been produced in 2004 [12], which follows the doctors until 2001, the 1994 paper has been used because it provided annual mortality by smoking habits at age of death, the 2004 paper does not provide figures for those over 85 and for former smokers under 45 years. Table 2.1 provides a comparison of the mortality rates as provided in both papers.

(see Table 2.1) and used to calculate the odds ratio for smokers versus formers smokers (A) and smokers versus non-smokers (B). The Actuary Life Tables [13] provide the 'real' mortality for each age (C).

The prevalence of smoking for each age and gender (D) was taken from the Health Survey for England [14], see Table 2.4, above.

The above information was used to calculate the actual mortality rates for smokers (E), former smokers (F) and non-smokers (G), by ensuring that the following equation was satisfied:

$$(E \times D1) + (F \times D2) + (G \times D3) = C$$

Where E:F = the odds ratio, A; E:G = B

This calculation is best illustrated using an example. Taking a 44 year old and substituting the prevalence of smoking and the actual mortality rate into the equation gives:

$$(E \times 0.26) + (F \times 0.21) + (G \times 0.53) = 0.002144$$

Further substituting the odds ratios reduces the equation to:

$$(E \times 0.26) + (E \times 0.21 \times 0.7143) + (E \times 0.53 \times 0.571) = 0.002144$$

This allows the equation to be solved as follows, to give an accurate estimate of the mortality for a 44 year old smoker, former smoker and non-smoker:

$$(E) = \left(\frac{0.002144}{0.26 + (0.21 \times 0.71423) + (0.53 \times 0.571}\right))$$

$$(E) = 0.0030$$

$$(F) = 0.002\,1$$

$$(G) = 0.0017$$

This process was repeated for all ages.

Table 2.1: Mortality by age, per 1,000

Age at death	Doll 1994			Doll 2004				
	Current smoker	Former	Non-smoker	Current smoker	Former smoker, by age stopped			Non-smoker
					35-44	45-54	55-64	
35-44	2.8	2	1.60	2.7	-	-	-	1.6
45-54	8.1	4.9	4.00	8.5	5.4	-	-	3.8
55-64	20.3	13.4	9.50	21.4	9.0	16.4	-	8.4
65-74	47	31.6	23.70	50.7	22.7	31.7	36.4	18.6
75-84	106	77.3	67.40	112.2	53.1	39.1	78.9	51.7
85+	218.7	179.7	168.60	-	-	-	-	-

2.3.3 Calculation of the Prevalence by Smoking Status of Each Co-morbidity

The literature was searched for information concerning the prevalence, by age, of each co-morbidity in the general population (regardless of smoking status) (A), the relative risk of each co-morbidity by smoking status (smokers versus formers smokers (B) and smokers versus non-smokers (C)) and the prevalence of smoking (D). This can be used to calculate the prevalence of each co-morbidity for a current smoker (E), former smokers (F) and non-smokers (G), by ensuring that the following equation was satisfied:

$$(E \times D1) + (F \times D2) + (G \times D3) = A$$

Where E:F = the odds ratio, B; G:F = the odds ratio C.

This can be illustrated using the example of a 60-year-old person with lung cancer. The prevalence of lung cancer is provided in Table 2.2 (Forman *et al.* 2003 [15]), the relative risk of lung cancer is shown in Table 2.3 (Peto *et al.* 2000 [16]) and the prevalence of smoking is shown in Table 2.4 (Health Survey for England [14]).

Table 2.2: Prevalence of lung cancer

Age	Prevalence
0-44	0.00%
45-64	***0.15%***
65+	0.80%
All ages	0.14%

Table 2.3: Relative risk of lung cancer by smoking status

	Smoker	Former	Non
RR	1	0.44	0.03

Table 2.4: The prevalence of smoking for men (for women)*

Age	Current cigarette smoker (D1)	Ex-regular cigarette smoker (D2)	Never regularly smoked cigarettes (D3)
16-24	0.25 (0.29)	0.05 (0.07)	0.69 (0.64)
25-34	0.37 (0.28)	0.14 (0.16)	0.49 (0.56)
35-44	0.26 (0.27)	0.21 (0.18)	0.53 (0.55)
45-54	0.25 (0.25)	0.30 (0.24)	0.44 (0.51)
55-64	**0.19** (0.20)	**0.44** (0.30)	**0.36** (0.50)
65-74	0.10 (0.13)	0.56 (0.29)	0.34 (0.57)
75+	0.07 (0.09)	0.61(0.34)	0.32 (0.57)
All ages	**0.24 (0.23)**	**0.29 (0.22)**	**0.47 (0.56)**

* The figures in brackets indicate the female prevalence figures

- Substituting the prevalence of smoking and the actual prevalence rate:

$$(E \times 0.19) + (F \times 0.44) + (G \times 0.36) = 0.15\,\%$$

- Substituting the odds ratios:

$$(E \times 0.19) + (E \times 0.44 \times 0.44) + (E \times 0.36 \times 0.03) = 0.15\%$$

$$(E) = \frac{(0.15\%)}{(0.19 + 0.44 \times 0.44) + (0.36 \times 0.03)}$$

$$(E) = 0.0038$$

$$(F) = 0.0017$$

$$(G) = 0.0001$$

This process was repeated for each age and gender for all co-morbidities. The prevalence of each co-morbidity, the relative risk by smoking status and resulting prevalence by age, gender and smoking status are shown in Appendices D to H.

2.3.4 Utility Weights

Each co-morbidity has an associated utility. Each cycle the number of people with each co-morbidity was multiplied by the associated utility and adjusted for the time-period spent in the health state. Where someone had more than one co-morbidity, the lowest utility was applied (an assumption used to overcome concerns of double counting in multiplicative or additive assumptions). This enabled the total QALYs of the interventions to be compared to 'no intervention'.

Tengs and Wallace carried out a review to report studies that included original quality of life (QoL) weights with the aim of compiling a list of QoL weights for 1,000 disease areas [17]. By searching the authors' own database (Health Priority Database), Medline, articles cited by others and the National Health Service Economic Evaluation Database, the literature search identified 1,100 potential studies of which 243 contained relevant information and

only 154 reported original data. Averages were calculated of the relevant utility scores provided by Tengs and Wallace were used for lung cancer, CHD, MI and stroke.

Six utility values were provided for lung cancer covering the following areas, an average of which was calculated:

- Small cell lung cancer with one cycle course of radiation;
- Small cell lung cancer with one cycle course of CAV chemotherapy;
- Small cell lung cancer with one cycle course of VP-16/cisplatin;
- Small cell lung cancer after disease progression;
- Small cell lung cancer that is in complete remission;
- Small cell lung cancer in partial remission of treatment.

The authors identified 28 papers with QoL weights for stroke. The weights included stroke patients who were in the following health states:

- Minor stroke:
  - With or without cognitive deficit;
  - First year after stroke;
  - Left with residual cerebral arteriovenous malformations after treatment.
- Moderate stoke:
  - With or without cognitive deficit;
  - Residual deficit in patients with prior myocardial infarction;
  - Language deficit;
  - Motor deficit.
- Acute requiring hospitalisation;
- Major stroke:
  - With or without the ability to speak;
  - First year after stroke;
  - Left with residual cerebral arteriovenous malformations after treatment;
  - Severe residual deficit in patients with prior myocardial infarction;
  - With or without cognitive deficit;
  - Language deficit;
  - Motor deficit.

The study only identified one paper for CHD (utility = 0.8) and 83 for post-MIs. The MI papers covered a range of patients included:

- General MIs;
- MI treated with streptokinase or recombinant tissue plasminogen activator, no dyspnea at rest/ on mild exertion or on strenuous exertion;
- MI patients unable to care for themselves;
- Acute MI;
- MI patients who did not experience a stroke or refraction;
- MI patients where rehabilitation had been provided.

Rutten-van Molken *et al.* 2006 [18] carried out a study to assess the association between country of recruitment and COPD utility. Data were taken from a subset of 1,235 patients from 13 countries that completed an EQ-5D questionnaire at the baseline of the 'Understanding the Potential Long-Term Implementation on Function with Tiotropim' (UPLIFT) trial. The UPLIFT trial was a four-year randomised, double-blind, placebo-controlled, parallel group trial designed to determine whether dopropium reduces the rate of decline of FEV over time. 6,000 COPD patients were included in the trial and the EQ-5D utility score was 0.76 at baseline. The EQ-5D scores were split into six groups based on the severity of COPD (moderate, severe and very severe) and whether patients were in the UK or the US. The model used an average of the UK scores for all severities of COPD.

Tillmann and Silcock [19] assessed the difference in health status between current and former smokers (who have not smoked for five years or more). To elicit their health status a questionnaire was sent to smokers and former smokers with nine general medical practices in Aberdeen, Scotland. The questions comprised SF-36, EuroQol, nine condition-specific questions selected from the MRC Questionnaire on Respiratory Symptoms and a range of socioeconomic questions. 1,500 questionnaires were sent out to former smokers and a further 1,494 were sent to smokers. Of the responders 778 former smokers and 887 smokers had valid responses to the questionnaires. The results show that the mean EuroQol score was 0.75 for smokers and 0.78 for former smokers.

The resulting utility scores used in the model are shown in Table 2.5. Whilst Tengs and Wallace provide utility scores for different severity levels of the co-morbidities in order for this to be reflected in the model we would need to know how many of the smokers, former smokers and non-smokers are in each of these states at any given time. This use of an average score negates this problem.

Table 2.5: Utility scores

Co-morbidity	Utility	Source
Lung cancer	0.58	[17]
Stroke	0.48	[17]
CHD	0.80	[17]
MI	0.80	[17]
COPD	0.73	[18]
No co-morbidities	0.75 current smoker 0.78 former smoker	[19]

2.3.5 Cost Data

Each co-morbidity has an associated cost. To enable the total costs of the interventions to be compared with 'no intervention' the number of people with each co-morbidity was multiplied by the associated cost of that co-morbidity, each cycle. This resulted in a total cost for each co-morbidity, to calculate an overall total cost these were summed together. The annual costs of each co-morbidity as used in the model are shown in Table 2.6.

Table 2.6: Annual cost of each co-morbidity (2006 £)

Disease	Average annual cost	Source
Lung cancer	£5,501	[20]
Stroke	£2,061	[14; 21; 22]
CHD	£1,063	[14; 22; 23]
MI	£2,175	[24-26]
COPD	£926	[27]

All costs have been inflated to January UK 2006 £ prices, using the following website:

- http://www.statistics.gov.uk/statbase/tsdataset.asp?vlnk=229&More=.

The *Health Care Needs Assessment* provides information on the evidence on the costs and cost-effectiveness and the optimum configuration of services for a number of disease areas, including lung cancer [20]. The authors of the lung cancer chapter acknowledge the fact that there is uncertainty surrounding the cost of palliative and terminal care but estimate it to be around £2,000 to £7,100 per person (1998 UK sterling). The average of these two figures was used in the model, £4,550 (£5,501 at current prices). It is unclear whether the reported figure takes account of gender differences in the number of people with lung cancer when calculating the cost.

The National Audit Office (NAO) [21] estimated that the direct cost of stroke was 2.8 billion each year (price year appears to be 2005). The total cost per person was calculated by dividing the total cost by the number of people with stroke in the UK, giving an estimated annual 2006 cost of £2,061[14; 22]. It has been assumed that the definition of stroke was the same in both data sources. A similar approach was used for the cost of CHD with the annual cost provided by the British Heart Foundation [23]. The costs of stroke and CHD are shown in Table 2.7.

Table 2.7: Annual cost of stroke and CHD (2006 £)

	Stroke	CHD
Total cost per year	2,867,200,000	3,809,320,747
Total population (men)	29,668,033	29,668,033
Total population (woman)	30,864,468	30,864,468
Percent with stroke / CHD (men)	2.4%	7%
Percent with stoke / CHD (women)	2.2%	5%
Average cost per person	**£2,061**	**£1,063**

The cost of MI has two components: the cost of an event and the ongoing yearly cost. The cost of an event was taken from reference costs with the ongoing costs based on monthly general practitioner (GP) visits, a follow-up cardiology visit every three months and cholesterol lowing drugs [24-26].

The annual cost of COPD was taken from Appendix D of the *Chronic Obstructive Pulmonary Disease: National Clinical Guideline on Management of Chronic Obstructive Pulmonary*

Disease in Adults in Primary and Secondary Care 2004 publication in Thorax [27]. This cost includes GP visits, medication, oxygen, inpatient stay and emergency admission. It is unclear whether the reported figure takes account of gender differences in the number of people with COPD when calculating the cost.

2.4 INTERVENTIONS

The data required for each of the interventions investigated were:

- The annual cost of the intervention (to the provider; in the case of the workplace model, this will be the employer);
- The length of time the intervention was applied;
- The proportion of people smoking (where 100% smoked before the intervention) at:
    - 6 months;
    - 12 months;
    - 24 months;
    - 60 months.

The data in the model were derived from the effectiveness Rapid Reviews, where possible, and from studies identified by NICE.

2.4.1 Scenarios

Without information concerning the cessation rates after one year, three scenarios have been modelled where:

- The quit rate is the same as the background cessation rate after one year;
- The quit rate is the same as the background cessation rate after two years;
- The quit rate is the same as the background cessation rate after five years.

After five years the probability of cessation returns to the background cessation rate for all interventions and scenarios.

2.4.2 Workplace

Javitz *et al.* 2004 [28], identified in the workplace cost-effectiveness Rapid Review, assessed the return on investment from an employer's perspective of four different smoking cessation programmes. The four programmes used (see Table 2.8) were two different bupropion regimes crossed with two different counselling approaches.

Table 2.8: Smoking cessation programmes used in the Javitz study

	Bupropion 150 mg	**Bupropion 300 mg**
Less intensive counselling 'LIC and bupropion'	150 mg Bup + less intensive counselling	300 mg Bup + less intensive counselling
More intensive counselling 'MIC and bupropion'	150 mg Bup + more intensive counselling	300 mg Bup + more intensive counselling

'LIC and bupropion' involves:

- Eight weeks of 150 mg bupropion;
- Personalised material;
- 5-10min scripted call after the quit date, from smoking cessation specialist (this was assumed to be a nurse);
- Access to 24hr automated free helpline.

'MIC and bupropion' involves:

- Eight weeks of 150 mg bupropion;
- Self help material and support for family and friends;
- In-depth phone assessment & counselling;
- Four brief pre-scheduled follow-up calls (assumed to be provided by a nurse);
- Access to free helpline for up to one year

See Table 2.9 for further details. The BNF recommends that 150 mg of bupropion is used and as such the 300 mg interventions described by Javitz have not been included in the analysis. The costs of these interventions are likely to be an underestimate due to a lack of information regarding the cost of providing a helpline and support for family and friends these have been excluded from the analysis.

Table 2.9: One-year cessation and costs

Intervention	1-year cessation	Total costs per employee	Source of costs
'LIC and bupropion' 150 mg Bup + less intensive counselling	23.6%	£75	[25; 29]
'MIC and bupropion' 150 mg Bup + more intensive counselling	31.4%	£92	[25; 29]

The above information can be used to run three scenarios for each of the 150mg bupropion interventions, see Tables 2.10 and 2.11 and Figures 2.2 and 2.3.

Table 2.10: 'LIC and bupropion': intervention quit rate 24%, background quit rate 2%

'LIC and bupropion' (24%)	'No intervention'	Quit rate = background after one year	Quit rate = background after two years	Quit rate = background after five years
Costs	0	£74.55	£74.55	£74.55
Proportion of smokers:				
At 6 months	99%	87%	87%	87%
At 12 months	98%	76%	76%	76%
At 24 months	96%	75%	58%	58%
At 60 months	90%	70%	55%	26%

Figure 2.2: 'LIC and bupropion'

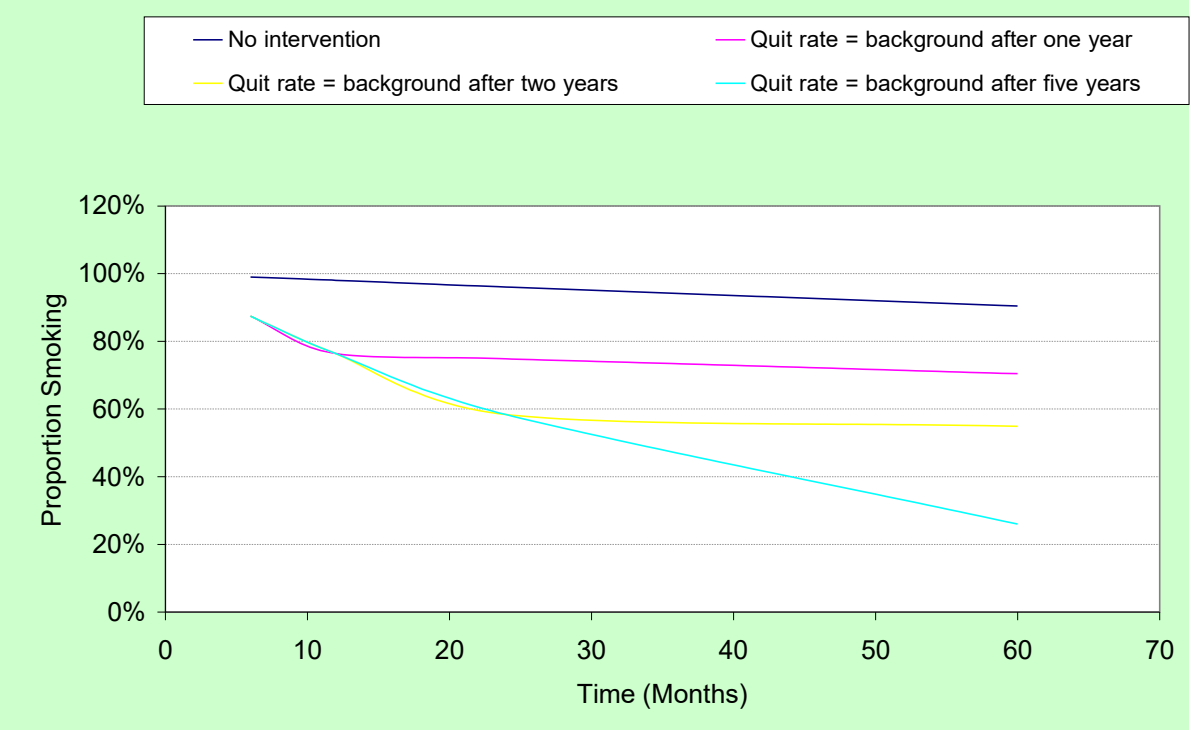
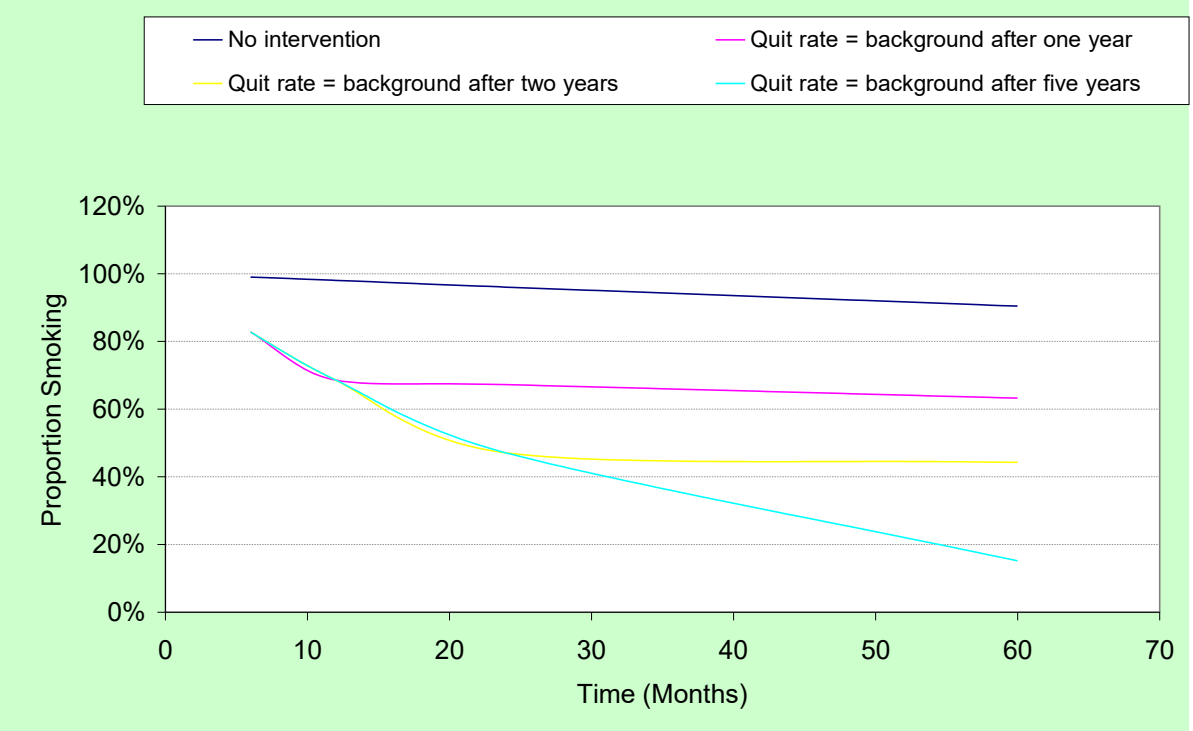


Table 2.11: 'MIC and bupropion': intervention quit rate 31%, background quit rate 2%

'MIC and bupropion' (31%)	'No intervention'	Quit rate = background after one year	Quit rate = background after two years	Quit rate = background after five years
Costs	0	£91.88	£91.88	£91.88
Proportion of smokers:				
At 6 months	99%	83%	83%	83%
At 12 months	98%	69%	69%	69%
At 24 months	96%	67%	47%	47%
At 60 months	90%	63%	44%	15%

Figure 2.3: 'MIC and bupropion'



2.4.3 NHS and Workplace

Parrott *et al.* 1998 [5] described the one-year cessation rates and cost per smoker associated with the following interventions:

- 'BA':
  - Three minutes of a GPs time.
- 'BA plus self-help material':
  - Four minutes of a GPs time;
  - Self-help material.
- 'BA plus self help material plus NRT':
  - Seven minutes of a GPs time;
  - Self-help material;
  - NRT (60.48 units).
- 'BA plus self-help material plus NRT plus specialist clinic':
  - Four minutes of a GPs time;
  - Self-help material;
  - NRT (60.48 units);
  - Clinic costs (include the cost of a nurse specialist, room costs and running costs).

Information regarding the cost components of the intervention was provided by Parrott. This was used to calculate the costs of the interventions using the BNF and Curtis and Netten [25; 29]. A sensitivity analysis was run where the costs of the intervention, to the employer, were assumed to be zero and it was assumed that employers might not incur the cost of

treatment. This is a conservative assumption as the employer might instead allow staff time off to recompense them for using their own time, which would have an associated cost.

There is an issue of the generalisability of the interventions identified within the Parrott study. Whilst the interventions identified are not specifically delivered within the workplace there is no information to suggest that the interventions described in the Parrott paper could not be provided within the workplace.

The impact that these assumptions have on the proportion smoking at different time points are shown in the following Tables and Figures.

Table 2.12: 'BA': intervention quit rate 3%, background quit rate 2%

'BA', annual cessation 3%	'No intervention'	Quit rate = background after one year	Quit rate = background after two years	Quit rate = background after five years
Costs	0	£7.14	£7.14	£7.14
Proportion of smokers:				
At 6 months	99%	98%	98%	98%
At 12 months	98%	97%	97%	97%
At 24 months	96%	95%	94%	94%
At 60 months	90%	89%	89%	86%

Figure 2.4: 'BA'

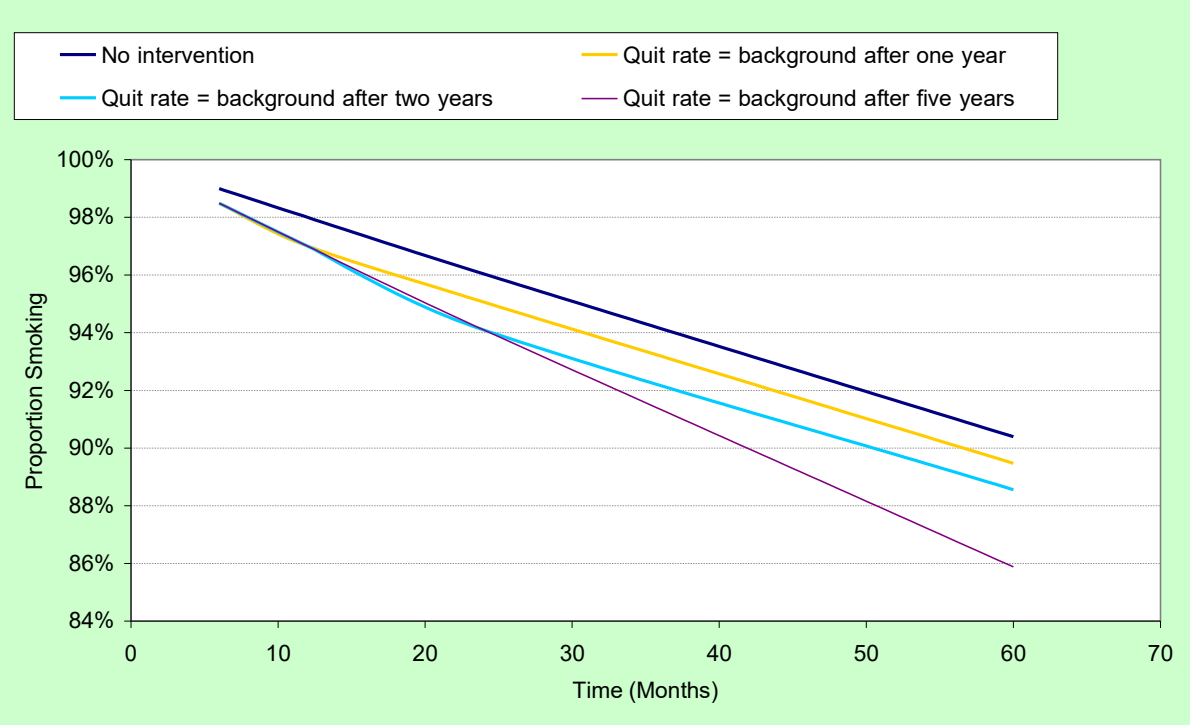


Table 2.13: 'BA plus self-help material': intervention quit rate 4%, background quit rate 2%

'BA plus self-help material', annual cessation 4%	'No intervention'	Quit rate = background after one year	Quit rate = background after two years	Quit rate = background after five years
Costs	0	10.67	£10.67	£10.67
Proportion of smokers:				
At 6 months	99%	98%	98%	98%
At 12 months	98%	96%	96%	96%
At 24 months	96%	94%	92%	92%
At 60 months	90%	89%	87%	82%

Figure 2.5: 'BA plus self-help material'

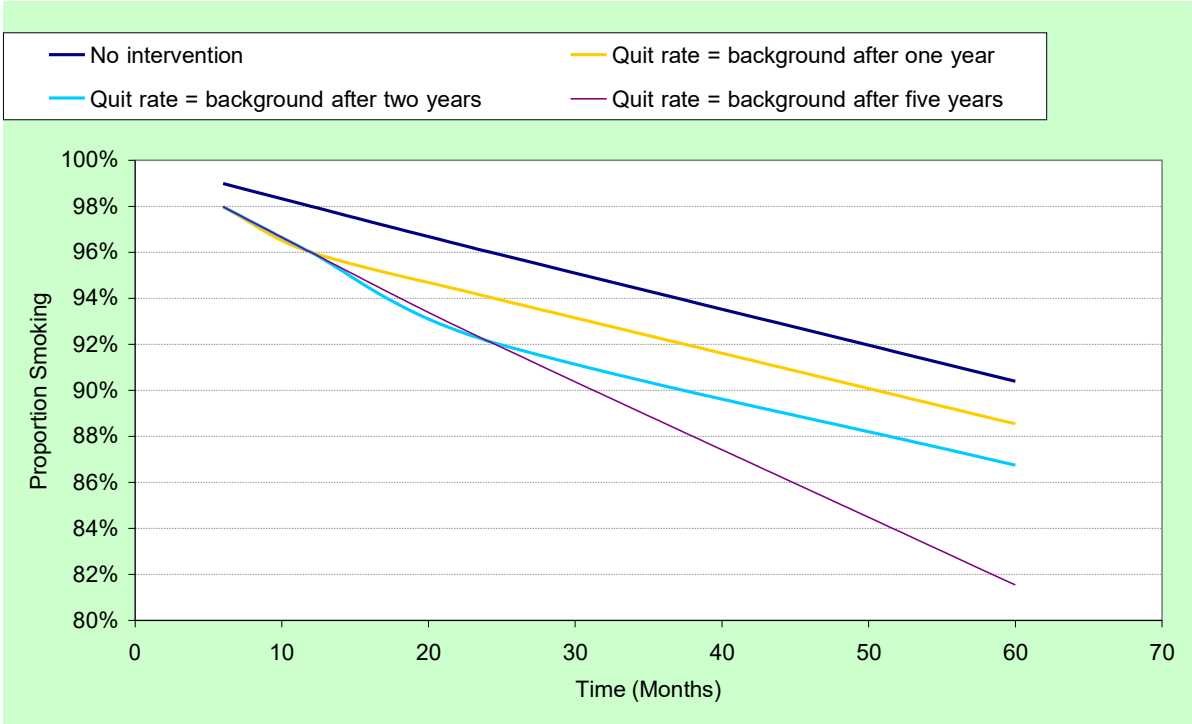


Table 2.14: **'BA plus self help material plus NRT': intervention quit rate 6%, background quit rate 2%**

Advice plus self-help material plus advice for NRT, annual cessation 6%	'No intervention'	Quit rate = background after one year	Quit rate = background after two years	Quit rate = background after five years
Costs	0	£111.10	£111.10	£111.10
Proportion of smokers:				
At 6 months	99%	97%	97%	97%
At 12 months	98%	94%	94%	94%
At 24 months	96%	88%	88%	92%
At 60 months	90%	83%	73%	87%

Figure 2.6: **'BA plus self help material plus NRT'**

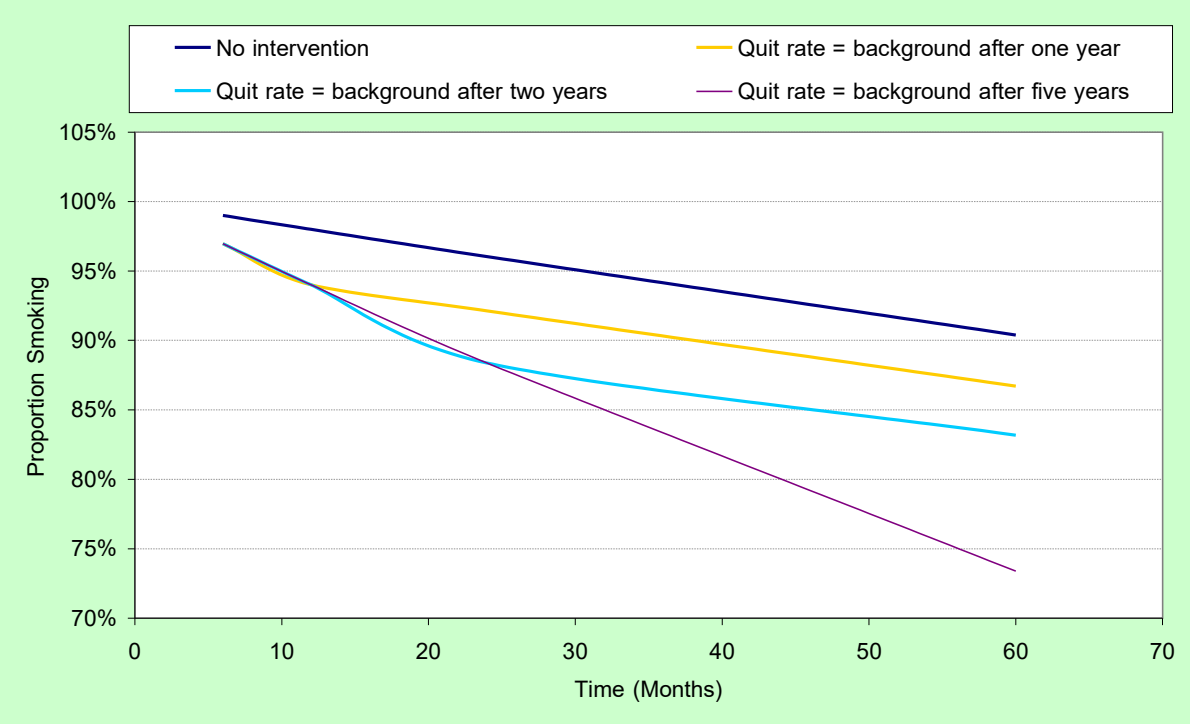
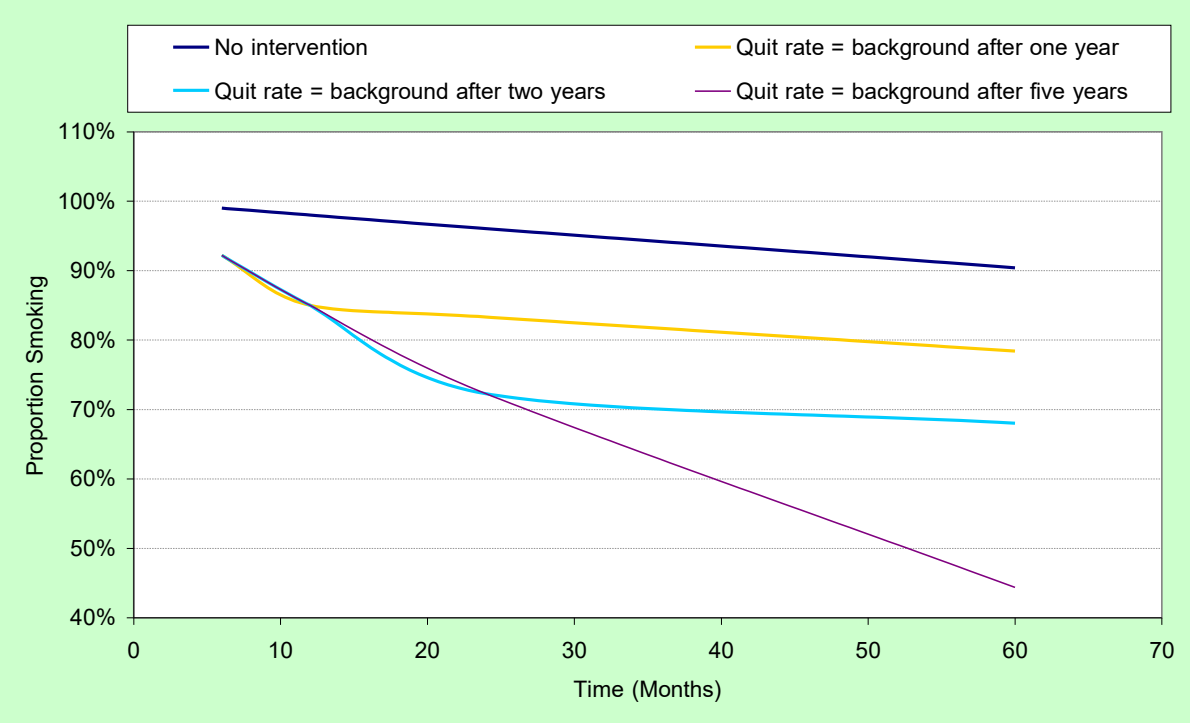


Table 2.15: **'BA plus self-help material plus NRT plus specialist clinic': intervention quit rate 15%, background quit rate 2%**

'BA plus self-help material plus NRT plus specialist clinic', annual cessation 15%	'No intervention'	Quit rate = background after one year	Quit rate = background after two years	Quit rate = background after five years
Costs	0	£122.96	£122.96	£122.96
Proportion of smokers:				
At 6 months	99%	92%	92%	92%
At 12 months	98%	85%	85%	85%
At 24 months	96%	83%	72%	72%
At 60 months	90%	78%	68%	44%

Figure 2.7: **'BA plus self-help material plus NRT plus specialist clinic'**



2.4.4 Mass Media

Until the mid 1990s 'No Smoking Day' was the leading smoking cessation campaign in the UK [30]. An evaluation of the 'No Smoking Day' was undertaken by Owen and Youdan, 2006 [30]. The study found that three months after the event 0.7% of all smokers were still not smoking. Only a small proportion of smokers were compliant with the 'No Smoking Day', 11% of whom were still not smoking more than three months after the day. To be able to use the 11% figure an assumption of complete compliance would have to be made.

The model requires information on the annual cessation rate of the intervention in question. The cessation rate appears to have been increasing from the 'No Smoking Day' to the three months follow-up, we would have to make an assumption of what the annual cessation rate would be. Hughes *et al.* 2004 [31] carried out a systematic literature review designed to investigate the shape of the relapse curve and the rate of long-term prolonged abstinence among smokers who try to quit without treatment, where data from the US was used. They found that, in the studies included in their review, most relapses occurred very early on and that the very few people relapse between three months and one year. The 0.7% cessation rate appears to be no better than the background cessation rate and therefore the 'No Smoking Day' intervention has been left out of the analysis.

2.4.5 Lost Productivity and Absenteeism

The impact of smoking related absence was identified by multiplying the number of smokers by the number of hours each smoker was absent per cycle. Three different estimates of the excess absence from work among smokers were used:

- Bertera *et al*. 1991 [32] estimated that the excess absence from work among smokers was 0.90 days per year (or 7.2 hours per year, 3.6 hours per six-month cycle in the model). This estimate of the excess absence from work among smokers has also been used in the analysis by Parrott *et al.* 2000 [33];
- Parrott *et al.* 2000 report that Nelson *et al.* 1986 estimated that the number of excess days absent each year for smokers was 7.3 (or 58 hours per year, 29 hours per six-month cycle in the model) [33; 34];
- A mid-point of the two (33 hours per year, 16 hours per 6-month cycle in the model).

The total extra hours lost for each smoker was then multiplied by the average hourly wage rate [35]. This was used to compare the effect on lost productivity of one intervention compared to another.

The base case analysis uses the midpoint value of the absenteeism with further analysis undertaken as sensitivity analysis.

Further analysis can be undertaken for different types of employers (e.g. factory workers and white collar workers) and different types of employment (e.g. piecework) if there are data concerning the excess absenteeism for smokers in these instances. However, applying an average figure for lost productivity, as above; across all workers but applying different wage rates may have equity implications as it would have a negative impact on low earners, whose productivity would be valued less than high earners.

The model adopts a conservative approach and excludes any other indirect costs, notably, costs that may result from smokers taking time out of their working day for smoking breaks. Whilst some data were identified on this, they suggest that interventions to reduce workplace harm from smoking, such as the introduction of smoking rooms or non-smoking environments, actually increase the amount of time lost during the working day amongst smokers [33]. There is also likely to be a significant difference in time lost across different categories of worker. For example, workers on a manufacturing line are much less likely to be able to take intermittent smoking breaks than those in professional, office-based positions. Because of these concerns, any lost productivity arising from this has been excluded from the current analysis.

2.4.6 No Intervention

The analysis was run for two different background quit rates of 1.2% and 2%. The base case analysis uses a 2% background quit rate, with an alternative analysis using the 1.2% rate, the results of which are discussed in the sensitivity analysis [36; 37].

2.5 ECONOMIC EVALUATION

Cost-effectiveness models are used to assess the relative benefits of a given treatment using patient outcomes and the costs incurred in achieving those outcomes. The calculation of the additional cost per additional unit gain of benefit (i.e. QALYs) is known as the incremental analysis and results are presented as incremental cost-effectiveness ratios (ICERs).

After incremental costs and QALYs were estimated, the ICERs were calculated using the following formula:

$$ICER = \frac{Cost_{\text{int ervention}} - Cost_{Comparator}}{Effect_{\text{int ervention}} - Effect_{Comparator}}$$

The incremental cost per QALY were calculated for all the interventions modelled.

2.6 DISCOUNTING

Costs and outcomes were discounted at 3.5% per year.

2.7 SENSITIVITY ANALYSIS

Sensitivity analysis was carried out to examine the impact on cost-effectiveness of changes in two variables:

- The background quit rate;
- The estimated number of house of excess absence from work.

The following sensitivity analysis was carried out:

- Background quit rate is 1.2%, excess absence = 16 hours a cycle;
- Background quit rate is 2%, excess absence = 3.6 hours a cycle;
- Background quit rate is 1.2%, excess absence = 3.6 hours a cycle;
- Background quit rate is 2%, excess absence = 29 hours a cycle;
- Background quit rate is 1.2%, excess absence = 29 hours a cycle;
- Background quit rate is 2%, excess absence = 16 hours a cycle, costs of the intervention are zero.

Section 3: Results

3.1 BASE CASE RESULTS

Table 3.1 provides the lifetime costs and QALYS, per person, associated with each intervention, using a 2% background rate and an absenteeism rate of 16 hours per cycle.

'BA', 'BA plus self-help material', 'BA plus self-help material plus NRT plus specialist clinic' 'LIC and bupropion' and 'MIC and bupropion', all result in decreased costs and increased QALYS compared to 'no intervention' under all scenarios. 'BA plus self help material plus NRT' results in increased costs, compared to 'no intervention' when conservative assumptions are made about the duration of cessation.

The lifetime costs include all medical costs that are incorporated in the model. As such, they include not only the cost of the intervention, but other costs such as treatment and co-morbidities. Therefore, the cost of 'no intervention' is quite substantial, since rates of complications are likely to be high. The results refer to the 'average' smoker included in the model. The results are, therefore, a weighted average cost and QALY for each patient in the 1,000 cohort.

Table 3.1: Base case results

	Background cessation = 2%	
	Cost	QALY
'No intervention'	£7,232	11.90
'BA' (3%)		
Quit rate = baseline after one year	£7,222	11.91
Quit rate = baseline after two years	£7,205	11.92
Quit rate = baseline after five years	£7,162	11.94
'BA plus self-help material' (4%)		
Quit rate = baseline after one year	£7,207	11.92
Quit rate = baseline after two years	£7,175	11.93
Quit rate = baseline after five years	£7,092	11.97
'BA plus self help material plus NRT' (6%)		
Quit rate = baseline after one year	£7,271	11.94
Quit rate = baseline after two years	£7,207	11.97
Quit rate = baseline after five years	£7,050	12.04
'BA plus self-help material plus NRT plus specialist clinic' (15%)		
Quit rate = baseline after one year	£7,123	12.02
Quit rate = baseline after two years	£6,935	12.11
Quit rate = baseline after five years	£6,555	12.29
'LIC and bupropion' (24%)		
Quit rate = baseline after one year	£6,923	12.09
Quit rate = baseline after two years	£6,643	12.23
Quit rate = baseline after five years	£6,176	12.45
'MIC and bupropion' (31%)		
Quit rate = baseline after one year	£6,802	12.16
Quit rate = baseline after two years	£6,459	12.33
Quit rate = baseline after five years	£5,987	12.56

3.2 COMPARING THE INTERVENTIONS TO 'NO INTERVENTION' OR 'BA'

Table 3.2 shows the results of comparing each intervention 'no intervention'. All interventions lead to a reduction in the number of smokers, fewer co-morbidities and more QALYs compared to 'no intervention'. The 'BA', 'BA plus self-help material' and 'BA plus self-help material plus NRT plus specialist clinic', 'LIC and bupropion' and 'MIC and bupropion' interventions result in lower costs than 'no intervention', for all scenarios.

'BA plus self help material plus NRT' has a high cessation rate. If the cessation rate is not maintained after one year the intervention is more costly than 'do nothing'. However, even in the worst case scenario the ICER is only £1,080.

Table 3.2: Comparing the interventions to 'no intervention'

Compared to 'no intervention'	Background cessation = 2%		
	Incremental cost	Incremental QALY	ICER
'BA' (3%)			
Quit rate = baseline after one year	-£11	0.01	Dominant
Quit rate = baseline after two years	-£27	0.02	Dominant
Quit rate = baseline after five years	-£70	0.04	Dominant
'BA plus self-help material' (4%)			
Quit rate = baseline after one year	-£25	0.02	Dominant
Quit rate = baseline after two years	-£57	0.03	Dominant
Quit rate = baseline after five years	-£141	0.07	Dominant
'BA plus self help material plus NRT' (6%)			
Quit rate = baseline after one year	£38	0.04	£1,080
Quit rate = baseline after two years	-£26	0.07	Dominant
Quit rate = baseline after five years	-£182	0.14	Dominant
'BA plus self-help material plus NRT plus specialist clinic' (15%)			
Quit rate = baseline after one year	-£109	0.11	Dominant
Quit rate = baseline after two years	-£297	0.21	Dominant
Quit rate = baseline after five years	-£677	0.39	Dominant
'LIC and bupropion' (24%)			
Quit rate = baseline after one year	-£309	0.19	Dominant
Quit rate = baseline after two years	-£589	0.33	Dominant
Quit rate = baseline after five years	-£1,057	0.55	Dominant
'MIC and bupropion' (31%)			
Quit rate = baseline after one year	-£430	0.26	Dominant
Quit rate = baseline after two years	-£773	0.43	Dominant
Quit rate = baseline after five years	-£1,246	0.65	Dominant

Table 3.3 shows the analysis of each intervention compared to 'BA'. Here only the 'BA plus self help material plus NRT' intervention results in more costs than 'BA' when the cessation rate returns to the background rate after one or two years.

Table 3.3: Comparing the interventions to 'BA'

Compared to 'BA'	Background cessation = 2%		
	Incremental cost	Incremental QALY	ICER
'BA plus self-help material' (4%)			
Quit rate = baseline after one year	-£14	0.01	Dominant
Quit rate = baseline after two years	-£30	0.02	Dominant
Quit rate = baseline after five years	-£71	0.04	Dominant
'BA plus self help material plus NRT' (6%)			
Quit rate = baseline after one year	£49	0.03	£1,857
Quit rate = baseline after two years	£2	0.05	£30
Quit rate = baseline after five years	-£112	0.10	Dominant
'BA plus self-help material plus NRT plus specialist clinic' (15%)			
Quit rate = baseline after one year	-£99	0.11	Dominant
Quit rate = baseline after two years	-£270	0.19	Dominant
Quit rate = baseline after five years	-£607	0.35	Dominant
'LIC and bupropion' (24%)			
Quit rate = baseline after one year	-£298	0.18	Dominant
Quit rate = baseline after two years	-£562	0.31	Dominant
Quit rate = baseline after five years	-£987	0.51	Dominant
'MIC and bupropion' (31%)			
Quit rate = baseline after one year	-£420	0.25	Dominant
Quit rate = baseline after two years	-£746	0.41	Dominant
Quit rate = baseline after five years	-£1,175	0.62	Dominant

3.3 NET FINANCIAL BENEFIT

Table 3.4 provides the cost per average person due to lost productivity for each intervention and scenario. The results are split into the effect at one year, five years and lifetime. The interventions result in lower productivity related costs compared to 'no intervention', due to the reduced number of smokers, see Table 3.5.

Table 3.4: Excess absence = 16 hours a cycle

	Annual cost per smoker	Background cessation = 2% Productivity losses per person		
		One year	Five years	Lifetime
'No intervention'	£0	£297	£1,277	£3,458
'BA' (3%)				
Quit rate = baseline after one year	£7	£295	£1,265	£3,423
Quit rate = baseline after two years	£7	£295	£1,256	£3,392
Quit rate = baseline after five years	£7	£295	£1,244	£3,315
'BA plus self-help material' (4%)				
Quit rate = baseline after one year	£11	£292	£1,253	£3,389
Quit rate = baseline after two years	£11	£292	£1,235	£3,327
Quit rate = baseline after five years	£11	£292	£1,212	£3,178
'BA plus self help material plus NRT' (6%)				
Quit rate = baseline after one year	£111	£288	£1,228	£3,320
Quit rate = baseline after two years	£111	£288	£1,193	£3,199
Quit rate = baseline after five years	£111	£288	£1,149	£2,919
'BA plus self-help material plus NRT plus specialist clinic' (15%)				
Quit rate = baseline after one year	£123	£267	£1,118	£3,009
Quit rate = baseline after two years	£123	£267	£1,013	£2,653
Quit rate = baseline after five years	£123	£267	£902	£1,972
'LIC and bupropion' (24%)				
Quit rate = baseline after one year	£75	£247	£1,012	£2,711
Quit rate = baseline after two years	£75	£247	£854	£2,179
Quit rate = baseline after five years	£75	£247	£713	£1,341
'MIC and bupropion' (31%)				
Quit rate = baseline after one year	£92	£228	£915	£2,441
Quit rate = baseline after two years	£92	£228	£722	£1,791
Quit rate = baseline after five years	£92	£228	£575	£941

Table 3.5 compares the net financial impact of each intervention to 'no intervention'. The benefit of the intervention (i.e. the lost productivity cost per person under each intervention minus that for the 'no intervention' group) is calculated. All interventions result in a positive benefit, but at one year this is very low.

The net financial benefit column in the table considers the impact to the employer by subtracting the cost of providing the intervention from the benefits in terms of productivity gains. As such, a positive net financial benefit suggests that the benefits of the intervention outweigh the costs to the employer.

'BA', and 'BA plus self-help material' result in a positive net financial benefit when the cessation rate is maintained for five years or more, due to the very small cost of the intervention. Because of the higher intervention costs, the following interventions 'advice plus self-help plus NRT', 'advice plus smoking cessation services', 'LIC and bupropion' and 'MIC and bupropion' are more difficult to justify to employers, with the interventions only showing a positive impact for the employer when the cessation rate is maintained over five years or more.

Table 3.5: Net financial benefit, compared to 'no intervention', excess absence = 16 hours a cycle

Compared to 'no intervention'	Background cessation = 2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA' (3%)						
Quit rate = baseline after one year	£2	£12	£35	-£5	£5	£27
Quit rate = baseline after two years	£2	£21	£66	-£5	£14	£59
Quit rate = baseline after five years	£2	£33	£142	-£5	£26	£135
'BA plus self-help material' (4%)						
Quit rate = baseline after one year	£5	£25	£69	-£6	£14	£58
Quit rate = baseline after two years	£5	£43	£131	-£6	£32	£120
Quit rate = baseline after five years	£5	£66	£279	-£6	£55	£269
'BA plus self help material plus NRT' (6%)						
Quit rate = baseline after one year	£9	£49	£138	-£102	-£62	£27
Quit rate = baseline after two years	£9	£85	£259	-£102	-£26	£148
Quit rate = baseline after five years	£9	£129	£539	-£102	£17	£428
'BA plus self-help material plus NRT plus specialist clinic' (15%)						
Quit rate = baseline after one year	£30	£160	£449	-£93	£37	£326
Quit rate = baseline after two years	£30	£265	£805	-£93	£142	£682
Quit rate = baseline after five years	£30	£375	£1,485	-£93	£252	£1,362
'LIC and bupropion' (24%)						
Quit rate = baseline after one year	£50	£266	£746	-£25	£191	£672
Quit rate = baseline after two years	£50	£423	£1,278	-£25	£348	£1,204
Quit rate = baseline after five years	£50	£564	£2,117	-£25	£490	£2,042
'MIC and bupropion' (31%)						
Quit rate = baseline after one year	£50	£362	£1,017	-£42	£271	£925
Quit rate = baseline after two years	£50	£555	£1,667	-£42	£463	£1,575
Quit rate = baseline after five years	£297	£703	£2,517	£205	£611	£2,425

In order for an employer to 'break even' the benefits of the intervention have to be equal to the cost. The benefit (productivity savings) column in Table 3.5 shows the maximum cost of each intervention in order for the employer to 'break even'. This depends on the time horizon used to evaluate benefits. For example, consider the 'BA' intervention. If the one-year benefits are considered, then the intervention needs to cost less than £2 for the employer to 'beak even'. However, if a lifetime time horizon is used then the invention can cost up to £142.

Table 3.6 compares each intervention to 'BA'. Again it can be seen that all interventions result in a productivity gains although the net benefit is equivocal.

Table 3.6: Net financial benefit, compared to 'BA' - Excess absence = 16 hours a cycle

Compared to 'BA'	Background cessation = 2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA plus self-help material' (4%)						
Quit rate = baseline after one year	£2	£12	£35	-£8	£2	£24
Quit rate = baseline after two years	£2	£21	£65	-£8	£11	£54
Quit rate = baseline after five years	£2	£33	£137	-£8	£22	£126
'BA plus self help material plus NRT' (6%)						
Quit rate = baseline after one year	£7	£37	£104	-£104	-£74	-£8
Quit rate = baseline after two years	£7	£63	£193	-£4	-£48	£82
Quit rate = baseline after five years	£7	£95	£396	-£4	-£16	£285
'BA plus self-help material plus NRT plus specialist clinic' (15%)						
Quit rate = baseline after one year	£27	£147	£414	-£96	£25	£291
Quit rate = baseline after two years	£27	£243	£739	-£96	£120	£616
Quit rate = baseline after five years	£27	£342	£1,343	-£96	£219	£1,220
'LIC and bupropion' (24%)						
Quit rate = baseline after one year	£47	£254	£712	-£27	£179	£637
Quit rate = baseline after two years	£47	£402	£1,212	-£27	£327	£1,138
Quit rate = baseline after five years	£47	£531	£1,974	-£27	£456	£1,900
'MIC and bupropion' (31%)						
Quit rate = baseline after one year	£66	£350	£982	-£26	£162	£620
Quit rate = baseline after two years	£66	£534	£1,601	-£26	£310	£1,121
Quit rate = baseline after five years	£66	£670	£2,374	-£26	£439	£1,882

3.4 SUMMARY OF RESULTS

Table 3.7 provides a summary of the main results.

Table 3.7: Summary of results- Excess absence = 16 hours a cycle

Compared to 'no intervention'	Effectiveness	Duration of intervention	Inc. cost	Inc. QALY	ICER	Net financial benefit*		
						One year	Five years	Lifetime
'BA'								
Quit rate = baseline after one year	3%	Three minutes of a GPs time.	-£11	0.01	Dominant	-£5	£5	£27
Quit rate = baseline after two years			-£27	0.02	Dominant	-£5	£14	£59
Quit rate = baseline after five years			-£70	0.04	Dominant	-£5	£26	£135
'BA plus self-help material'								
Quit rate = baseline after one year	4%	Four minutes of a GPs time; Self-help material.	-£25	0.02	Dominant	-£6	£14	£58
Quit rate = baseline after two years			-£57	0.03	Dominant	-£6	£32	£120
Quit rate = baseline after five years			-£141	0.07	Dominant	-£6	£55	£269
'BA plus self help material plus NRT'								
Quit rate = baseline after one year	6%	Seven minutes of a GPs time; Self-help material; NRT.	£38	0.04	£1,080	-£102	-£62	£27
Quit rate = baseline after two years			-£26	0.07	Dominant	-£102	-£26	£148
Quit rate = baseline after five years			-£182	0.14	Dominant	-£102	£17	£428
'BA plus self-help material plus NRT plus specialist clinic'								
Quit rate = baseline after one year	15%	Four minutes of a GPs time; Self-help material; NRT; Clinic costs.	-£109	0.11	Dominant	-£93	£37	£326
Quit rate = baseline after two years			-£297	0.21	Dominant	-£93	£142	£682
Quit rate = baseline after five years			-£677	0.39	Dominant	-£93	£252	£1,362
'LIC and bupropion'								
Quit rate = baseline after one year	24%	8 weeks of bupropion; self-help material; 5-10min scripted call.	-£309	0.19	Dominant	£50	£266	£746
Quit rate = baseline after two years			-£589	0.33	Dominant	£50	£423	£1,278
Quit rate = baseline after five years			-£1,057	0.55	Dominant	£50	£564	£2,117
'MIC and bupropion'								
Quit rate = baseline after one year	31%	8 weeks of bupropion; self-help material, five calls with smoking specialist.	-£430	0.26	Dominant	£50	£362	£1,017
Quit rate = baseline after two years			-£773	0.43	Dominant	£50	£555	£1,667
Quit rate = baseline after five years			-£1,246	0.65	Dominant	£297	£703	£2,517

* The net financial benefit considers the impact to the employer by subtracting the cost of providing the intervention from the benefits in terms of productivity gains. As such, a positive net financial benefit suggests that the benefits of the intervention outweigh the costs to the employer.

3.5 INCREMENTAL ANALYSIS

Incremental analysis would normally be carried out to compare each intervention to the 'next best' intervention in terms of the total costs and QALYs. However, the 'MIC and bupropion' intervention is the cheapest and the most effective intervention and therefore assuming that the interventions are mutually exclusive it dominates all the other interventions. If the NHS only interventions are examined then 'BA plus self-help material plus NRT plus specialist clinic' is the cheapest and the most effective intervention and therefore assuming that the interventions are mutually exclusive it dominates all the other NHS interventions.

3.6 SENSITIVITY ANALYSIS

The results of the following sensitivity analysis are shown in Appendix I to N:

- Background quit rate is 1.2%, excess absence = 16 hours a cycle;
- Background quit rate is 2%, excess absence = 3.6 hours a cycle;
- Background quit rate is 1.2%, excess absence = 3.6 hours a cycle;
- Background quit rate is 2%, excess absence = 29 hours a cycle;
- Background quit rate is 1.2%, excess absence = 29 hours a cycle;
- Background quit rate is 2%, excess absence = 16 hours a cycle, costs of the intervention are zero.

Background quit rate is 1.2%, excess absence = 16 hours a cycle

Reducing the background cessation rate to 1.2% but keeping everything else the same led to similar results as presented in the base case. All interventions apart from the 'BA plus self help material plus NRT' intervention dominate 'no intervention'. 'BA plus self help material plus NRT' has an ICER of £280. Compared to 'BA' the results follow the same pattern as in the base case analysis.

There are slightly more people remaining smokers (reduced background quit rate) resulting in the lost productivity results being marginally higher than in the base case. Overall patern all interventions result in a positive net financial benefit when the cessation rate is maintained for five or more years.

Excess absence = 3.6 hours a cycle

With a more conservative level of smoking related absenteeism regardless of the background cessation all interventions start to show a net positive financial benefit after five years.

Excess absence = 29 hours a cycle

When the rate of smoking related absenteeism is increased to 7 days (29 hours in six months), compared to 'no intervention' the 'BA plus self help material plus NRT' intervention

has a positive net financial benefit after five years and for all years for 'BA', 'BA plus self-help material' and the 'LIC and bupropion' interventions.

Background quit rate is 2%, excess absence = 16 hours a cycle, costs of the intervention are zero

When the costs of the interventions are assumed to be zero all the interventions are dominant when compared to 'no intervention' or 'BA' (the interventions are less costly and result in more QALYs). From an employer's perspective all intervention offer positive benefits and no costs and are, therefore, worthwhile.

Section 4: Discussion and Conclusions

4.1 MAIN FINDINGS AND CONCLUSIONS

This analysis considers five interventions, each analysed using three scenarios. Interventions that have a low cost and a low cessation rate dominate 'no intervention'. Interventions with a higher cost and high cessation rate only dominate 'no intervention' if the cessation rate is maintained beyond the duration of the intervention, i.e. the one-year cessation rate is maintained over a prolonged time period before returning to the background cessation rate. However, under all scenarios, the cost per QALY of each of the interventions was low (maximum = £1,080).

When a conservative approach to the excess absenteeism is assumed (0.9 days in a year or 3.6 hours in six months), only interventions with a low cost produce a net financial benefit in terms of productivity gains outweighing the cost of the intervention. If the amount of excess absenteeism is increased to 7 days a year (29 hours in six months) then more expensive interventions also produce positive net financial gains after five years.

It should be noted that, where the net financial benefit to the employer is negative, this is not necessarily a sufficient argument to restrict access to smoking cessation services in the workplace. The net financial benefit approach assumes that all the costs of the intervention are borne by the employer. Where the net financial benefit to the employer is marginal but the benefit to the NHS is significant, there may be a case for suggesting that these interventions should be provided on a subsidised basis by the NHS. When the cost of the intervention to the employer was assumed to be zero all interventions have a positive benefit and dominate both 'no intervention' and 'BA'.

4.2 FURTHER ANALYSIS

The net financial benefit to the employer only considers the costs associated with absenteeism. Further analysis could be undertaken where other costs, such as medical costs and insurance costs, are included. The feasibility of this analysis would depend on the availability of data.

4.3 LIMITATIONS

There are a number of limitations inherent within the model. Due to a lack of data on the relative risk of having each co-morbidity by smoking status it was not possible to 'spilt' former smokers into 'recent' and 'long-term' categories. It is unclear what the impact of this simplification will have on the model's results. If the probability of developing some or all of the co-morbidities returns to the level found in non-smokers after a certain period of time the model will have overestimated the number of people with each co-morbidity. This in-turn

may have resulted in an overestimation of the associated costs and an underestimation of the associated QALYs.

Within the model it is assumed that smokers attempt one type of cessation intervention and only try it once. In 'real life' smokers who fail to quit with one intervention may:

- Be more likely to repeat the intervention successfully;
- Go on to try a number of different smoking cessation interventions.

The effectiveness of the interventions were taken from published studies and may not be generalisable to the general population.

4.4 OTHER STUDIES

The results of this study are consistent with the results of other economic evaluations of smoking cessation interventions. Smoking cessation interventions have been shown to result in greater benefits at lower or marginally higher costs than 'no intervention' or 'BA'. Smoking cessation interventions that model NRT and bupropion have been shown to be more cost-effective than counselling alone. With incremental cost-effectiveness ratios (cost per life year saved) of between £800 and £3,500 (2006 £), when compared to counselling alone [38]. An annual background cessation rate of 2.5% along with a 35% lifetime probability of relapse after one-year abstinence was used in the analysis. Song *et al.* 2002 [39], using a background quit rate of 1%, evaluated the cost-effectiveness of bupropion and NRT for smoking cessation. The costs and effectiveness of the interventions used were similar to those in the Parrott study (the annual quit rate for advice alone was 4% and for counselling was 10%; the costs of the interventions ranged from £4 for BA to £194 for counselling plus NRT and bupropion SR). The incremental costs per life year saved compared to advice or counselling alone ranged from £774-1,687 (2006 £).

In an economic analysis to determine the cost-effectiveness of smoking interventions in the Netherlands, Feenstra *et al*. 2005 [40] investigated five face-to-face interventions compared to current practice for smoking cessation advice offered by GPs (using 2000 euros). The results are shown in Table 4.1. Details of the interventions are as follows:

- 'Minimal counselling', lasting 12 minutes, provided by a GP;
- 'Minimal GP counselling plus NRT';
- 'Intensive counselling plus NRT';
- 'Intensive counselling plus bupropion';
- 'Telephone counselling'.

Compared to current practice 'minimal counselling' was a dominant intervention, generating both gains in QALYs and life years, with lower costs. The incremental cost per QALY gained of the other interventions when using a 75-year time horizon ranged from €1,100 (£758) for the 'telephone counselling' to €4,900 (£3,377) for the 'intensive counselling plus NRT'. All five interventions were cost-effective compared to current practice. The minimal GP

counselling was also shown to be a dominant intervention, compared to current practice, when a one-year and ten-year implementation time horizon was used. Our results cost-effectiveness results are slightly lower than those found here. The 'minimal counselling plus NRT' is the most similar to the 'BA plus self help material plus NRT' intervention used in our model. Table 4.1 compares these two interventions, showing that the slight differences in our results could be due to a lower intervention cessation rate and/or lower comparator costs.

Table 4.1: Minimal counselling plus NRT' and 'BA plus self help material plus NRT'

	Feenstra		Our model	
	Intervention	Comparator	Intervention	Comparator
	'Minimal counselling plus NRT'	Current practice	'BA plus self help material plus NRT'	'BA'
Annual cessation (%)	12.7	3.5	6	3
Cost of the intervention (2006 £)	30	111	111	2
Incremental cost per QALY (2006 £)	965		1,857	

4.5 SUMMARY

Our model shows that all the interventions studied are cost-effective when compared to 'no intervention' or 'BA'. Interventions that have a low cost and a low cessation rate dominate 'no intervention'. Interventions with a higher cost and high cessation rate only dominate 'no intervention' if the cessation rate is maintained beyond the duration of the intervention. However, under all scenarios, the cost per QALY of each of the interventions was low, when compared to 'no intervention. This supports the position as shown in other papers.

The 'MIC and bupropion' intervention is the cheapest and the most effective intervention and therefore assuming that the interventions are mutually exclusive it dominates all the other interventions.

References

1. Macnair T. *Reasons to Stop Smoking*. http://www.bbc.co.uk/health/ask_the_doctor/smokingstop.shtml. Date Accessed: 8 Feb. 2006.

2. UK Health Care. *COPD Fact Sheet*. http://www.ukhealthcare.uky.edu/healthfocus/fact_sheets/copdfst.htm. Date Accessed: 8 Feb. 2006.

3. Twigg L, Moon G, Walker L. *The Smoking Epidemic in England*.

4. International Agency for Research on Cancer 2002. *Scientific Committee on Tobacco and Health Report 2004*.

5. Parrott S, Godfrey C, Raw M, West R, McNeill A. Guidance for commissioners on the cost effectiveness of smoking cessation interventions. Health Educational Authority. *Thorax*. 1998; **53 Suppl 5 Pt 2** 1-38.

6. Department of Health Depart. *NHS Stop Smoking Services and Nicotine Replacement Therapy*. http://www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/Tobacco/TobaccoGeneralInformation/TobaccoGeneralArticle/fs/en?CONTENT_ID=4002192&chk=5Xx9q6. Date Accessed: 14 Dec. 2006.

7. Department of Health. *Smoking in Pregnancy Services 2002/2003*. http://www.dh.gov.uk/assetRoot/04/01/98/16/04019816.pdf. Date Accessed: 14 Dec. 2006.

8. Godfrey C, Parrott S, Coleman T, Pound E. The cost-effectiveness of the English smoking treatment services: evidence from practice. *Addiction*. 2005; **100** (Suppl 2): 70-83.

9. Stapleton J. *Cost effectiveness of NHS smoking cessation services*. http://www.ash.org.uk/html/cessation/ashcost.html. Date Accessed.

10. Office for National Statistics. *Interim Revised Population Estimates: England and Wales 2000*. http://www.statistics.gov.uk/. Date Accessed.

11. Doll R, Peto R, Wheatley K, Gray R, Sutherland I. Mortality in Relation to Smoking - 40 Years Observations on Male British Doctors. *British Medical Journal*. 1994; **309** (6959): 901-911.

12. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. *British Medical Journal*. 2004; **328** (7455): 1519-1528.

13. *Life Tables*. http://www.gad.gov.uk/Life_Tables/docs/wltewm0204.xls. Date Accessed: 16 Oct. 2006.

14. *Health survey for England 2004.* http://www.ic.nhs.uk/pubs/hlthsvyeng2004upd/04TrendTabs.xls/file07/08/2006. Date Accessed: 17 Oct. 2006.

15. Forman D, Stockton D, Moller H, Quinn M, Babbo P, De Angelis R, Micheli A. Cancer Prevalence in the UK: Results from the EUROPREVAL Study. *Annals of Oncology*. 2003; **14** 648-654.

16. Peto R, Darby S, Deo H, Silcocks P, Whitley E, Doll R. Smoking, Smoking Cessation, and Lung Cancer in the UK Since 1950: Combination of National Statistics with Two Case-Control Studies. *British Medical Journal*. 2000; **321** 323-329.

17. Tengs T Wallace A. One Thousand Health-Related Quality-of-Life Estimates. *Medical Care*. 2000; **38** (6): 583-637.

18. Rutten-van Molken MP, Oostenbrink JB, Tashkin DP, Burkhart D, Monz BU. Does quality of life of COPD patients as measured by the generic EuroQol five-dimension questionnaire differentiate between COPD severity stages? *Chest*. 2006; **130** (4): 1117-28.

19. Tillmann M Silcock J. A Comparison of Smokers' and Ex-smokers' Health-Related Quality of Life. *Journal of Public Health Medicine*. 1997; **19** (2683): 273.

20. Sanderson H Spiro S. *Cancer of the Lung, First Series*. http://hcna.radcliffe-oxford.com/cancerlung.htm. Date Accessed: 17 Nov. 2006.

21. Bourn J. *Reducing Brain Damage: Faster Access to Better Stroke Care*. http://www.nao.org.uk/publications/nao_reports/05-06/0506452.pdf. Date Accessed: 17 Nov. 2006.

22. Government Actuary's Department. *Population Projections by the Government Actuary*. http://www.gad.gov.uk/Population/2004/uk/wuk045y.xls. Date Accessed: 17 Nov. 2006.

23. Petersen S, Peto V, Rayner M, Leal J, Luengo-Fernandez R, Gray A. *Health Care Costs of CVD and CHD, 2003, United Kingdom*. http://www.heartstats.org/temp/Tabsp13.1spweb05.xls. Date Accessed: 17 Nov. 2006.

24. Department of Health. *NHS Reference Costs 2005*. http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4133221&chk=TxHkqo. Date Accessed.

25. Curtis L Netten A. *Unit Cost of Health and Social Care*. http://www.pssru.ac.uk/pdf/uc/uc2005/uc2005.pdf. Date Accessed: 21 Nov. 2006.

26. Health & Social Care Information Centre. *Prescription Cost Analysis: England 2005*. http://www.ic.nhs.uk/pubs/prescostanalysis2005/pcaexcel/file. Date Accessed: 17 Nov. 2006.

27. Chronic Obstructive Pulmonary Disease. National Clinical Guideline on Management of Chronic Obstructive Pulmonary Disease in Adults in Primary and Secondary Care. *Thorax*. 2004; **59** (Supplement 1).

28. Javitz HS, Swan GE, Zbikowski SM, Curry SJ, McAfee TA, Decker D, Patterson R, Jack LM. Return on investment of different combinations of bupropion SR dose and behavioral treatment for smoking cessation in a health care setting: An employer's perspective. *Value in Health*. 2004; **7** (5): 535-543.

29. British Medical Association and Royal Pharmaceutical Society of Great Britain. *Joint Formulary Committee. British National Formulary. 52 ed. London*. http://www.bnf.org/bnf/. Date Accessed: 17 Oct. 2006.

30. Owen L Youdan B. 22 Years On: The Impact and Relevance of the UK No Smoking Day. *Tobacco Control*. 2006; **15** 19-25.

31. Hughes J, Keely J, Naud S. Shape of the Relapse Curve and long-term Abstinence Among Untreated Smokers. *Addiction*. 2004; **99** 29-38.

32. Bertera RL. The effects of behavioral risks on absenteeism and health-care costs in the workplace. *Journal of Occupational Medicine*. 1991; **33** (11): 1119-24.

33. Parrott S, Godfrey C, Raw M. Costs of employee smoking in the workplace in Scotland. *Tobacco Control*. 2000; **9** (2): 187-92.

34. Nelson H. *The Economic Consequences of Smoking in Northern Ireland. Belfast Ulster Cancer Foundation*. 1986.

35. Department of Health. *Hourly pay - Excluding overtime (£) - For all employee jobsa: United Kingdom, 2005*. http://www.statistics.gov.uk/downloads/theme_labour/ASHE_2005/Table2_6a.xls. Date Accessed: 30 Oct. 2006.

36. Stapleton J. Cigarette Smoking Prevalence, Cessation and Relapse. *Statistical Methods in Medical Research*. 1998; **7** 187-203.

37. West R. *Background Smoking Cessation Rates in England*. www.smokinginengland.info/paper2.pdf. Date Accessed: 7 Dec. 2006.

38. Cornuz J, Gilbert A, Pinget C, McDonald P, Slama K, Salto E, Paccaud F. Cost-effectiveness of pharmacotherapies for nicotine dependence in primary care settings: a multinational comparison. *Tobacco Control*. 2006; **15** (3): 152-9.

39. Song F, Raftery J, Aveyard P, Hyde C, Barton P, Woolacott N. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. *Medical Decision Making*. 2002; **22** (Supplement): S26-S37.

40. Feenstra TL, Hamberg-van Reenen HH, Hoogenveen RT, Rutten-van Molken MP. Cost-effectiveness of face-to-face smoking cessation interventions: a dynamic modeling study. *Value in Health*. 2005; **8** (3): 178-190.

41. Allender S, Peto V, Scarborough P, Boxer A, Rayner M. *Coronary Heart Disease Statistics, 2006 Edition*. 2006.

42. Department of Health and Human Services, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Washington DC. *The Health Consequences of Smoking: A Report by the Surgeon General*. 2004.

43. Britton M. The Burden of COPD in the UK: Results from the Confronting COPD Survey. *Respiratory Medicine*. 2003; **97** S71-S79.

APPENDIX A

Population Weights

Table A.1: Population weights

Age	Total	Male	Female
16	0.87%	0.43%	0.44%
17	0.87%	0.43%	0.44%
18	0.87%	0.43%	0.44%
19	0.87%	0.43%	0.44%
20	0.87%	0.43%	0.44%
21	0.87%	0.43%	0.44%
22	0.87%	0.43%	0.44%
23	0.87%	0.43%	0.44%
24	0.87%	0.43%	0.44%
25	1.85%	0.93%	0.93%
26	1.85%	0.93%	0.93%
27	1.85%	0.93%	0.93%
28	1.85%	0.93%	0.93%
29	1.85%	0.93%	0.93%
30	2.10%	1.05%	1.05%
31	2.10%	1.05%	1.05%
32	2.10%	1.05%	1.05%
33	2.10%	1.05%	1.05%
34	2.10%	1.05%	1.05%
35	2.09%	1.03%	1.05%
36	2.09%	1.03%	1.05%
37	2.09%	1.03%	1.05%
38	2.09%	1.03%	1.05%
39	2.09%	1.03%	1.05%
40	1.84%	0.92%	0.92%
41	1.84%	0.92%	0.92%
42	1.84%	0.92%	0.92%
43	1.84%	0.92%	0.92%
44	1.84%	0.92%	0.92%
45	1.69%	0.84%	0.85%
46	1.69%	0.84%	0.85%
47	1.69%	0.84%	0.85%
48	1.69%	0.84%	0.85%
49	1.69%	0.84%	0.85%
50	1.83%	0.91%	0.92%
51	1.83%	0.91%	0.92%
52	1.83%	0.91%	0.92%
53	1.83%	0.91%	0.92%
54	1.83%	0.91%	0.92%
55	1.48%	0.73%	0.75%
56	1.48%	0.73%	0.75%
57	1.48%	0.73%	0.75%
58	1.48%	0.73%	0.75%
59	1.48%	0.73%	0.75%
60	1.31%	0.64%	0.67%
61	1.31%	0.64%	0.67%
62	1.31%	0.64%	0.67%
63	1.31%	0.64%	0.67%
64	1.31%	0.64%	0.67%
65	1.18%	0.56%	0.61%
66	1.18%	0.56%	0.61%
67	1.18%	0.56%	0.61%

68	1.18%	0.56%	0.61%
69	1.18%	0.56%	0.61%
70	1.06%	0.48%	0.58%
71	1.06%	0.48%	0.58%
72	1.06%	0.48%	0.58%
73	1.06%	0.48%	0.58%
74	1.06%	0.48%	0.58%
75	0.92%	0.38%	0.54%
76	0.92%	0.38%	0.54%
77	0.92%	0.38%	0.54%
78	0.92%	0.38%	0.54%
79	0.92%	0.38%	0.54%
80	0.57%	0.21%	0.36%
81	0.57%	0.21%	0.36%
82	0.57%	0.21%	0.36%
83	0.57%	0.21%	0.36%
84	0.57%	0.21%	0.36%
85	0.35%	0.10%	0.24%
86	0.35%	0.10%	0.24%
87	0.35%	0.10%	0.24%
88	0.35%	0.10%	0.24%
89	0.35%	0.10%	0.24%
90	0.08%	0.02%	0.06%
91	0.08%	0.02%	0.06%
92	0.08%	0.02%	0.06%
93	0.08%	0.02%	0.06%
94	0.08%	0.02%	0.06%
95	0.08%	0.02%	0.06%
96	0.08%	0.02%	0.06%
97	0.08%	0.02%	0.06%
98	0.08%	0.02%	0.06%
99	0.08%	0.02%	0.06%
100	0.08%	0.02%	0.06%
Total	**100.00%**	**48.00%**	**52.00%**

APPENDIX B

Additional Search Strategies

B.1 PRODUCTIVITY LOSSES AND ABSENTEEISM

MEDLINE and In-Process MEDLINE. 2000-2006/Sep week 3. Searched 2nd October 2006

1. Smoking/
2. (smoke or smoker or smokers or smoking).ti,ab.
3. (tobacco or cigar$).ti,ab.
4. or/1-3
5. ((loss$ or lost or reduc$) adj3 productivity).ti,ab.
6. ((loss$ or lost or reduc$) adj3 output$).ti,ab.
7. 5 or 6
8. 4 and 7
9. Absenteeism/
10. Sick Leave/
11. (sick$ adj3 (certificat$ or absence or leave or work)).ti,ab.
12. absenteeism.ti,ab.
13. or/9-12
14. 4 and 13
15. 8 or 14

EMBASE. 2000-2006/week 39. Searched 2nd October 2006

1. SMOKING/
2. (smoke or smoker or smokers or smoking).ti,ab.
3. (tobacco or cigar$).ti,ab.
4. or/1-3
5. PRODUCTIVITY/
6. ((loss$ or lost or reduc$) adj3 productivity).ti,ab.
7. ((loss$ or lost or reduc$) adj3 output$).ti,ab.
8. or/5-7
9. 4 and 8
10. ABSENTEEISM/
11. Medical Leave/
12. (sick$ adj3 (certificat$ or absence or leave or work)).ti,ab.
13. absenteeism.ti,ab.
14. or/10-13
15. 4 and 14
16. 9 or 15

CINAHL. 2000-2006/Sep week 4. Searched 2nd October 2006

1. SMOKING/
2. (smoke or smoker or smokers or smoking).ti,ab.
3. (tobacco or cigar$).ti,ab.
4. or/1-3
5. ((loss$ or lost or reduc$) adj3 productivity).ti,ab.
6. ((loss$ or lost or reduc$) adj3 output$).ti,ab.
7. PRODUCTIVITY/
8. or/5-7
9. 4 and 8
10. ABSENTEEISM/
11. Sick Leave/
12. (sick$ adj3 (certificat$ or absence or leave or work)).ti,ab.
13. absenteeism.ti,ab.
14. or/10-13

15. 4 and 14
16. 9 or 15

Health Management Information Consortium (HMIC). 2000-2006/Sep. Searched 2nd October 2006

1. exp SMOKING/
2. (smoke or smoker or smokers or smoking).ti,ab.
3. (tobacco or cigar$).ti,ab.
4. or/1-3
5. exp PRODUCTIVITY/
6. ((loss$ or lost or reduc$) adj3 productivity).ti,ab.
7. ((loss$ or lost or reduc$) adj3 output$).ti,ab.
8. or/5-7
9. 4 and 8
10. exp ABSENTEEISM/
11. exp SICK LEAVE/
12. (sick$ adj3 (certificat$ or absence or leave or work)).ti,ab.
13. absenteeism.ti,ab.
14. or/10-13
15. 4 and 14
16. 9 or 15

NHS Economic Evaluation Database (NHS EED). CRD internal database. 2000-2006/Sep. Searched 2nd October 2006

s smoke or smoker or smokers or smoking
s tobacco or cigar$
s s1 or s2
s (loss$ or lost or reduc$)(w3)productivity
s (loss$ or lost or reduc$)(w3)output$
s s4 or s5
s s3 and s6
s sick$(w3)(certificat$ or absence or leave or work)
s absenteeism
s s8 or s9
s s3 and s10

B.2 ANNUAL COSTS OF LUNG CANCER AND STROKE IN THE UK

Lung Cancer

Sanderson H, Spiro S. *Cancer of the lung*. In. Stevens A, Raftery J, Mant J, Simpson S. Health care needs assessment: the epidemiologically based needs assessment reviews: Volume 1. Second Edition. Abingdon: Radcliffe Publishing, 2004. p.503-548.

Stroke

Mant J, Wade D, Winner S. *Stroke*. In. Stevens A, Raftery J, Mant J, Simpson S. Health care needs assessment: the epidemiologically based needs assessment reviews: Volume 1. Second Edition. Abingdon: Radcliffe Publishing, 2004. p.141-244.

National Audit Office. *Reducing brain damage: faster access to better stroke care*. London: Stationery Office, 2005.

B.3 UTILITIES: MYOCARDIAL INFARCTION; CHRONIC OBSTRUCTIVE PULMONARY DISEASE; LUNG CANCER; CORONARY HEART DISEASE; AND STROKE

MEDLINE and In-Process MEDLINE. 1996-2006/Nov week 1. Searched 15th November 2006

1. exp Quality-Adjusted Life Years/
2. quality adjusted life year$.ti,ab.
3. qaly$.ti,ab.
4. (utility or utilities).ti,ab.
5. (preference or preferences).ti,ab.
6. (time adj2 trade).ti,ab.
7. standard gamble.ti,ab.
8. rating scale.ti,ab.
9. or/1-8
10. *Myocardial Infarction/
11. 9 and 10
12. *Pulmonary Disease, Chronic Obstructive/
13. 9 and 12
14. *Lung Neoplasms/
15. 9 and 14
16. *Coronary Disease/
17. 9 and 16
18. *Cerebrovascular Accident/
19. 9 and 18

EMBASE. 1996-2006/week 45. Searched 15th November 2006

1. exp quality adjusted life year/
2. quality adjusted life year$.ti,ab.
3. qaly$.ti,ab.
4. (utility or utilities).ti,ab.
5. (preference or preferences).ti,ab.
6. standard gamble.ti,ab.
7. rating scale.ti,ab.
8. or/1-7
9. *Heart Infarction/
10. 8 and 9
11. *Chronic Obstructive Lung Disease/
12. 8 and 11
13. *Lung Cancer/
14. 8 and 13
15. *Ischemic Heart Disease/
16. 8 and 15
17. *STROKE/
18. 8 and 17

NHS Economic Evaluation Database (NHS EED). CRD internal database. 2006/Oct. Searched 15th November 2006

s quality(w)adjusted(w)life(w)year$
s qaly$
s utility or utilities
s preference or preferences
s time(w2)trade
s standard(w)gamble
s rating(w)scale
s s1 or s2 or s3 or s4 or s5 or s6 or s7
s myocardial(w)infarct$
s s8 and s9
s chronic(w)obstructive(w)pulmonary(w)disease$ or COPD
s s8 and s11
s lung(w)(cancer$ or neoplasm$)
s s8 and s13
s coronary(w2)disease or CHD
s s8 and s15
s stroke
s s8 and s17

Health Economic Evaluation Database (HEED). CD-ROM. September 2006. Searched 15th November 2006

AX=(quality adjusted life year) or (quality adjusted life years)
AX=qaly or qalys
AX= utility or utilities
AX=preference or preferences
AX=(time trade off)
AX=(standard gamble)
AX=(rating scale)
CS=1 or 2 or 3 or 4 or 5 or 6 or 7
AX=(myocardial infarction)
CS=8 and 9
AX=(chronic obstructive pulmonary disease) or COPD
CS=8 and 11
AX=(lung cancer) or (lung cancers) or (lung neoplasm) or (lung neoplasms)
CS=8 and 13
AX='coronary disease' within 2 OR CHD
CS=8 and 15
AX=stroke
CS=8 and 17

The Cost-Effectiveness (CEA) Registry. Internet. Comprehensive Table of Cost-Utility Ratios 2002-2003 and Comprehensive Table of Cost-Utility Ratios 1976-2001. Searched 15th November 2006

B.4 ASSOCIATION BETWEEN SMOKING AND COPD/STROKE: SEPARATED INTO CURRENT, FORMER AND NEVER SMOKERS

MEDLINE and In-Process MEDLINE. 1996-2006/Nov week 2. Searched 20th November 2006

1. Smoking/
2. (former$ and never and current$).ti,ab.
3. (smoking status).ti,ab.
4. 1 and (2 or 3)
5. Pulmonary Disease, Chronic Obstructive/
6. ((chronic adj2 pulmon$) or copd).ti,ab.
7. 5 or 6
8. 4 and 7
9. Cerebrovascular Accident/
10. stroke.ti,ab.
11. 9 or 10
12. 4 and 11

EMBASE. 1996-2006/week 46. Searched 20th November 2006

1. SMOKING/
2. (former$ and never and current$).ti,ab.
3. smoking status.ti,ab.
4. 1 and (2 or 3)
5. Chronic Obstructive Lung Disease/
6. ((chronic adj2 pulmon$) or copd).ti,ab.
7. 5 or 6
8. 4 and 7
9. STROKE/
10. stroke.ti,ab.
11. 9 or 10
12. 4 and 11

NHS Economic Evaluation Database (NHS EED). CRD internal database. 2006/Oct. Searched 20th November 2006

s smoking
s former$ and never and current$
s smoking(w)status
s s1 and (s2 or s3)
s chronic(w2)pulmon$ or copd
s s4 and s5
s stroke
s s4 and s7

Health Economic Evaluation Database (HEED). CD-ROM. October 2006. Searched 20th November 2006

AX=smoking
AX=(former and never and current)
AX=(smoking status)
CS=1 and (2 or 3)
AX='chronic pulmonary' within 2 OR COPD
CS=4 and 5
AX=stroke
CS=4 and 7

APPENDIX C

Male Mortality in the General Population

Table C.1: Male mortality in the general population

Age	Mortality
0	0.005709
1	0.000414
2	0.000243
3	0.000182
4	0.000145
5	0.000114
6	0.000122
7	0.000101
8	0.000106
9	0.000117
10	0.000106
11	0.000122
12	0.000142
13	0.000173
14	0.000192
15	0.000254
16	0.000321
17	0.000486
18	0.000644
19	0.000612
20	0.000738
21	0.000665
22	0.000778
23	0.000759
24	0.000716
25	0.000820
26	0.000786
27	0.000765
28	0.000815
29	0.000851
30	0.000923
31	0.000937
32	0.001037
33	0.001027
34	0.001052
35	0.001124
36	0.001217
37	0.001302
38	0.001279
39	0.001457
40	0.001595
41	0.001648
42	0.001822
43	0.002132
44	0.002144
45	0.002345
46	0.002623
47	0.002956
48	0.003201
49	0.003554
50	0.003901

Age	Mortality
51	0.004234
52	0.004641
53	0.004968
54	0.005386
55	0.005915
56	0.006354
57	0.007306
58	0.007891
59	0.008734
60	0.010033
61	0.010965
62	0.012447
63	0.013166
64	0.014799
65	0.016079
66	0.017600
67	0.019556
68	0.021774
69	0.024228
70	0.026342
71	0.029574
72	0.032947
73	0.036459
74	0.040973
75	0.045751
76	0.050710
77	0.056151
78	0.061724
79	0.069489
80	0.075742
81	0.083605
82	0.091501
83	0.097921
84	0.106861
85	0.118207
86	0.135494
87	0.148454
88	0.161954
89	0.175991
90	0.185602
91	0.200472
92	0.220085
93	0.239483
94	0.251598
95	0.280321
96	0.292331
97	0.310996
98	0.331163
99	0.345437
100	0.362748

APPENDIX D

Lung Cancer

Table D.1: Prevalence of lung cancer [15]

Age	Prevalence
0-44	0.00%
45-64	0.15%
65+	0.80%
All ages	0.14%

Table D.2: Relative risk of lung cancer by smoking status [16]

	Smoker	Former	Non
Men	1	0.44	0.03
Women	1	0.21	0.05

Table D.3: Prevalence of lung cancer by smoking status

	Men			Women		
Age	Smoker	Former smoker	Non	Smoker	Former smoker	Non
16	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
17	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
18	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
19	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
20	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
21	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
22	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
23	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
24	0.00007	0.00003	0.00000	0.00006	0.00001	0.00000
25	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
26	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
27	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
28	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
29	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
30	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
31	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
32	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
33	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
34	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
35	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
36	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
37	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
38	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
39	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
40	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
41	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
42	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
43	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
44	0.00005	0.00002	0.00000	0.00006	0.00001	0.00000
45	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
46	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
47	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
48	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
49	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
50	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
51	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
52	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
53	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
54	0.00383	0.00169	0.00012	0.00214	0.00045	0.00011
55	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
56	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
57	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
58	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
59	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
60	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
61	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
62	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
63	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
64	0.00384	0.00169	0.00012	0.00241	0.00051	0.00012
65	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
66	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
67	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
68	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
69	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
70	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
71	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
72	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
73	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
74	0.02236	0.00984	0.00067	0.01007	0.00211	0.00050
75	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
76	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
77	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
78	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
79	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
80	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
81	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
82	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
83	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
84	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
85	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
86	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
87	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
88	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
89	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
90	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
91	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
92	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
93	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
94	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
95	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
96	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
97	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
98	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
99	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058
100	0.02304	0.01014	0.00069	0.01167	0.00245	0.00058

APPENDIX E

Coronary Heart Disease

Table E.1: Prevalence of CHD [41]

Age	Prevalence
16-24	0.00%
25-34	0.00%
35-44	0.90%
45-54	3.50%
55-64	11.10%
65-74	21.50%
75+	26.40%

Table E.2: Relative risk of CHD by smoking status [42]

	Smoker	Former	Non
RR	3.12	1.55	1

Table E.3: Prevalence of CHD by smoking status

	Men			Women		
Age	Smoker	Former smoker	Non	Smoker	Former smoker	Non
16	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
17	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
18	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
19	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
20	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
21	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
22	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
23	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
24	0.00000	0.00000	0.00000	0.00378	0.00188	0.00121
25	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
26	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
27	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
28	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
29	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
31	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
32	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
33	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
34	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
35	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
36	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
37	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
38	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
39	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
40	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
41	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
42	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
43	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
44	0.01677	0.00833	0.00538	0.00747	0.00371	0.00239
45	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
46	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
47	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
48	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
49	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
50	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
51	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
52	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
53	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
54	0.06416	0.03188	0.02057	0.03767	0.01871	0.01207
55	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
56	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
57	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
58	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
59	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
60	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
61	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
62	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
63	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
64	0.20977	0.10421	0.06724	0.11597	0.05761	0.03717
65	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
66	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
67	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
68	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
69	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
70	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
71	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
72	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
73	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
74	0.44038	0.21878	0.14115	0.20962	0.10414	0.06718
75	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
76	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
77	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
78	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
79	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
80	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
81	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
82	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
83	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
84	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
85	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
86	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
87	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
88	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
89	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
90	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
91	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
92	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
93	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
94	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
95	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
96	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
97	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
98	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
99	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294
100	0.55568	0.27606	0.17810	0.41478	0.20606	0.13294

APPENDIX F

Chronic Obstructive Pulmonary Disease

Table F.1: Prevalence of COPD [43]

Age	Prevalence
0-64	1.00%
65-74	5.00%
75+	10.00%

Table F.2: Relative risk of COPD by smoking status

This is the association between smoking and the risk of acute respiratory illness used as a proxy for COPD [42].

	Smoker	Former	Non
Men	1	0.84	0.68
Women	1	0.96	0.92

Table F.3: Prevalence of COPD by smoking status

	Men			Women		
Age	Smoker	Former smoker	Non	Smoker	Former smoker	Non
16	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
17	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
18	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
19	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
20	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
21	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
22	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
23	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
24	0.01299	0.01091	0.00883	0.01057	0.01015	0.00973
25	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
26	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
27	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
28	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
29	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
30	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
31	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
32	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
33	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
34	0.01216	0.01022	0.00827	0.01054	0.01012	0.00970
35	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
36	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
37	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
38	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
39	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
40	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
41	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
42	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
43	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
44	0.01254	0.01053	0.00853	0.01054	0.01012	0.00970
45	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
46	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
47	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
48	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
49	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
50	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
51	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
52	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
53	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
54	0.01236	0.01038	0.00840	0.01053	0.01011	0.00969
55	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
56	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
57	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
58	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
59	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
60	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
61	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
62	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
63	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
64	0.01231	0.01034	0.00837	0.01055	0.01013	0.00971
65	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
66	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
67	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
68	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
69	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
70	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
71	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
72	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
73	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
74	0.06235	0.05237	0.04240	0.05306	0.05093	0.04881
75	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
76	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
77	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
78	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
79	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
80	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
81	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
82	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
83	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
84	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
85	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
86	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
87	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
88	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
89	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
90	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
91	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
92	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
93	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
94	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
95	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
96	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
97	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
98	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
99	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777
100	0.12504	0.10504	0.08503	0.10627	0.10202	0.09777

APPENDIX G

Myocardial Infarction

Table G.1: Prevalence of MI [41]

Age	Prevalence
0-54	0.00%
55-64	6.70%
65-74	12.10%

Table G.2: Relative risk of MI by smoking status [42]

	Smoker	Former	Non
Men	1.6	1.11	1.00
Women	2.76	1.05	1

Table G.3: Prevalence of MI by smoking status

	Men			Women		
Age	Smoker	Former smoker	Non	Smoker	Former smoker	Non
16	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
17	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
18	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
19	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
20	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
21	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
22	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
23	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
24	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
25	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
26	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
27	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
28	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
29	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
30	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
31	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
32	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
33	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
34	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
35	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
36	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
37	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
38	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
39	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
40	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
41	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
42	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
43	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
44	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
45	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
46	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
47	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
48	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
49	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
50	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
51	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
52	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
53	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
54	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
55	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
56	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
57	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
58	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
59	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
60	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
61	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
62	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
63	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
64	0.09210	0.06390	0.05756	0.04250	0.01617	0.01540
65	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
66	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
67	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
68	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
69	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
70	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
71	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
72	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
73	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
74	0.17246	0.11965	0.10779	0.09283	0.03532	0.03363
75	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
76	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
77	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
78	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
79	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
80	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
81	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
82	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
83	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
84	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
85	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
86	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
87	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
88	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
89	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
90	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
91	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
92	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
93	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
94	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
95	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
96	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
97	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
98	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
99	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555
100	0.17463	0.12115	0.10914	0.09811	0.03732	0.03555

APPENDIX H

Stroke

Table H.1: Prevalence of stroke [41]

Age	Prevalence
16-24	0%
25-34	0%
35-44	0.30%
45-54	1.20%
55-64	2.20%
65-74	7.60%
75+	13.30%

Table H.2: Relative risk of Stroke by smoking status [42]

	Smoker	Former	Non
RR	1.37	1.11	1.00

Table H.3: Prevalence of stroke by smoking status

	Men			Women		
Age	Smoker	Former smoker	Non	Smoker	Former smoker	Non
16	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
17	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
18	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
19	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
20	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
21	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
22	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
23	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
24	0.00125	0.00101	0.00091	0.00246	0.00199	0.00179
25	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
26	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
27	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
28	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
29	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
30	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
31	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
32	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
33	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
34	0.00475	0.00385	0.00347	0.00367	0.00297	0.00268
35	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
36	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
37	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
38	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
39	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
40	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
41	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
42	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
43	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
44	0.00367	0.00297	0.00268	0.00734	0.00595	0.00536
45	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
46	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
47	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
48	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
49	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
50	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
51	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
52	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
53	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
54	0.01459	0.01182	0.01065	0.01103	0.00894	0.00805
55	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
56	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
57	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
58	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
59	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
60	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
61	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
62	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
63	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
64	0.02691	0.02181	0.01965	0.03095	0.02507	0.02259
65	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
66	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
67	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
68	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
69	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
70	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
71	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
72	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
73	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
74	0.09473	0.07675	0.06914	0.06840	0.05542	0.04993
75	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
76	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
77	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
78	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
79	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
80	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
81	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
82	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
83	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
84	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
85	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
86	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
87	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
88	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
89	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
90	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
91	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
92	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
93	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
94	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
95	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
96	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304

	Men			Women		
Age	**Smoker**	**Former smoker**	**Non**	**Smoker**	**Former smoker**	**Non**
97	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
98	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
99	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304
100	0.16675	0.13510	0.12172	0.11377	0.09218	0.08304

APPENDIX I

Background Quit Rate is 1.2%,
Excess Absence = 16 Hours a Cycle

Table I.1: Base case results, quit rate = baseline after one year

	Background cessation = 1.2%	
	Cost	QALY
'No intervention'	£7,470	11.80
'BA' (3%)	£7,442	11.82
'BA plus self-help material' (4%)	£7,425	11.83
'BA plus self help material plus NRT' (6%)	£7,484	11.84
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£7,316	11.93
'LIC and bupropion' (24%)	£7,096	12.02
'MIC and bupropion' (31%)	£6,957	12.09

Table I.2: Comparing the interventions to 'no intervention', quit rate = baseline after one year

Compared to 'no intervention'	Background cessation = 1.2%		
	Incremental cost	Incremental QALY	ICER
'BA' (3%)	-£28.90	0.02	Dominant
'BA plus self-help material' (4%)	-£45.39	0.03	Dominant
'BA plus self help material plus NRT' (6%)	£13.16	0.05	£280
'BA plus self-help material plus NRT plus specialist clinic' (15%)	-£154.82	0.13	Dominant
'LIC and bupropion' (24%)	-£374.02	0.22	Dominant
'MIC and bupropion' (31%)	-£512.93	0.29	Dominant

Table I.3: Comparing the interventions to 'BA', quit rate = baseline after one year

Compared to 'BA'	Background cessation = 1.2%		
	Incremental cost	Incremental QALY	ICER
'BA plus self-help material' (4%)	-£16	0.01	Dominant
'BA plus self help material plus NRT' (6%)	£42	0.03	£1,439
'BA plus self-help material plus NRT plus specialist clinic' (15%)	-£126	0.12	Dominant
'LIC and bupropion' (24%)	-£345	0.20	Dominant
'MIC and bupropion' (31%)	-£484	0.28	Dominant

Table I.4: Lost productivity - Excess absence = 16 hours a cycle, quit rate = baseline after one year

	Annual cost per smoker	Background cessation = 1.2% Productivity losses per person		
		One year	Five years	Lifetime
'No intervention'	£0	£299	£1,305	£3,754
'BA' (3%)	£7	£295	£1,282	£3,687
'BA plus self-help material' (4%)	£11	£292	£1,270	£3,650
'BA plus self help material plus NRT' (6%)	£111	£288	£1,245	£3,575
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£123	£267	£1,133	£3,240
'LIC and bupropion' (24%)	£75	£247	£1,025	£2,919
'MIC and bupropion' (31%)	£92	£228	£927	£2,628

Table I.5: Net financial benefit, compared to 'no intervention' - Excess absence = 16 hours a cycle, quit rate = baseline after one year

Compared to 'no intervention'	Background cessation = 1.2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA' (3%)	£4	£22	£67	-£3	£15	£60
'BA plus self-help material' (4%)	£6	£35	£104	-£4	£24	£94
'BA plus self help material plus NRT' (6%)	£11	£60	£179	-£100	-£51	£68
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£31	£172	£514	-£91	£49	£391
'LIC and bupropion' (24%)	£52	£280	£835	-£23	£205	£760
'MIC and bupropion' (31%)	£70	£378	£1,126	-£22	£286	£1,034

Table I.6: Net financial benefit, compared to 'BA' - Excess absence = 16 hours a cycle, quit rate = baseline after one year

Compared to 'BA'	Background cessation = 1.2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA plus self-help material' (4%)	£2	£12	£37	-£8	£2	£27
'BA plus self help material plus NRT' (6%)	£7	£37	£112	-£104	-£74	£1
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£27	£150	£447	-£96	£27	£324
'LIC and bupropion' (24%)	£47	£257	£768	-£27	£183	£693
'MIC and bupropion' (31%)	£66	£355	£1,059	-£26	£263	£967

APPENDIX J

Background Quit Rate is 2%,
Excess Absence = 3.6 Hours a Cycle

Table J.1: Lost productivity - Excess absence = 3.6 hours a cycle, quit rate = baseline after one year

	Annual cost per smoker	Background cessation = 2% Productivity losses per person		
		One year	Five years	Lifetime
'No intervention'	£0	£65	£280	£759
'BA' (3%)	£7	£65	£278	£751
'BA plus self-help material' (4%)	£11	£64	£275	£744
'BA plus self help material plus NRT' (6%)	£111	£63	£270	£729
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£123	£59	£245	£660
'LIC and bupropion' (24%)	£75	£54	£222	£595
'MIC and bupropion' (31%)	£92	£50	£201	£536

Table J.2: Comparing the interventions to 'no intervention', excess absence = 3.6 hours a cycle, quit rate = baseline after one year

Compared to 'no intervention'	Background cessation = 2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA' (3%)	£0	£3	£8	-£7	-£4	£0
'BA plus self-help material' (4%)	£1	£5	£15	-£10	-£5	£4
'BA plus self help material plus NRT' (6%)	£2	£11	£30	-£109	-£100	-£81
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£7	£35	£99	-£116	-£88	-£24
'LIC and bupropion' (24%)	£11	£58	£164	-£64	-£16	£89
'MIC and bupropion' (31%)	£15	£80	£223	-£77	-£12	£131

Table J.3: Comparing the interventions to 'BA', excess absence = 3.6 hours a cycle, quit rate = baseline after one year

Compared to 'BA'	Background cessation = 2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA plus self-help material' (4%)	£0	£3	£8	-£10	-£8	-£3
'BA plus self help material plus NRT' (6%)	£1	£8	£23	-£110	-£103	-£88
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£6	£32	£91	-£117	-£91	-£32
'LIC and bupropion' (24%)	£10	£56	£156	-£64	-£19	£82
'MIC and bupropion' (31%)	£14	£77	£216	-£77	-£15	£124

APPENDIX K

Background Quit Rate is 1.2%,
Excess Absence = 3.6 Hours a Cycle

Table K.1: Lost productivity - Excess absence = 3.6 hours a cycle, quit rate = baseline after one year

	Annual cost per smoker	Background cessation = 1.2% Productivity losses per person		
		One year	Five years	Lifetime
'No intervention'	£0	£66	£286	£824
'BA' (3%)	£7	£65	£281	£809
'BA plus self-help material' (4%)	£11	£64	£279	£801
'BA plus self help material plus NRT' (6%)	£111	£63	£273	£785
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£123	£59	£249	£711
'LIC and bupropion' (24%)	£75	£54	£225	£641
'MIC and bupropion' (31%)	£92	£50	£203	£577

Table K.2: Net financial benefit, compared to 'no intervention' - Excess absence = 3.6 hours a cycle, quit rate = baseline after one year

Compared to 'no intervention'	Background cessation = 1.2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA' (3%)	£1	£5	£15	-£6	-£2	£8
'BA plus self-help material' (4%)	£1	£8	£23	-£9	-£3	£12
'BA plus self help material plus NRT' (6%)	£2	£13	£39	-£109	-£98	-£72
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£7	£38	£113	-£116	-£85	-£10
'LIC and bupropion' (24%)	£11	£61	£183	-£63	-£13	£109
'MIC and bupropion' (31%)	£15	£83	£247	-£76	-£9	£155

Table K.3: Net financial benefit, compared to 'BA' - Excess absence = 3.6 hours a cycle, quit rate = baseline after one year

Compared to 'BA'	Background cessation = 1.2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA plus self-help material' (4%)	£0	£3	£8	-£10	-£8	-£2
'BA plus self help material plus NRT' (6%)	£1	£8	£25	-£110	-£103	-£87
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£6	£33	£98	-£117	-£90	-£25
'LIC and bupropion' (24%)	£10	£56	£169	-£64	-£18	£94
'MIC and bupropion' (31%)	£14	£78	£233	-£77	-£14	£141

APPENDIX L

Background Quit Rate is 2%,
Excess Absence = 29 Hours a Cycle

Table L.1: Lost productivity - Excess absence = 29 hours a cycle, quit rate = baseline after one year

	Annual cost per smoker	Background cessation = 2% Productivity losses per person		
		One year	Five years	Lifetime
'No intervention'	£0	£528	£2,274	£6,156
'BA' (3%)	£7	£524	£2,253	£6,095
'BA plus self-help material' (4%)	£11	£520	£2,231	£6,034
'BA plus self help material plus NRT' (6%)	£111	£512	£2,187	£5,911
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£123	£476	£1,990	£5,357
'LIC and bupropion' (24%)	£75	£440	£1,801	£4,827
'MIC and bupropion' (31%)	£92	£407	£1,629	£4,346

Table L.2: Net financial benefit, compared to 'no intervention' - Excess absence = 29 hours a cycle, quit rate = baseline after one year

Compared to 'no intervention'	Background cessation = 2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA' (3%)	£4	£22	£61	-£3	£15	£54
'BA plus self-help material' (4%)	£8	£44	£123	-£3	£33	£112
'BA plus self help material plus NRT' (6%)	£16	£87	£246	-£95	-£24	£135
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£53	£284	£799	-£70	£161	£676
'LIC and bupropion' (24%)	£89	£473	£1,329	£14	£399	£1,254
'MIC and bupropion' (31%)	£122	£645	£1,810	£30	£554	£1,718

Table L.3: Net financial benefit, compared to 'BA' - Excess absence = 29 hours a cycle, quit rate = baseline after one year

Compared to 'BA'	Background cessation = 2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA plus self-help material' (4%)	£4	£22	£61	-£7	£11	£51
'BA plus self help material plus NRT' (6%)	£12	£66	£184	-£99	-£46	£73
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£49	£263	£738	-£74	£140	£615
'LIC and bupropion' (24%)	£85	£452	£1,268	£10	£377	£1,193
'MIC and bupropion' (31%)	£118	£624	£1,749	£26	£532	£1,657

APPENDIX M

Background Quit Rate is 1.2%,
Excess Absence = 29 Hours a Cycle

Table M.1: Lost productivity - Excess absence = 29 hours a cycle, quit rate = baseline after one year

	Annual cost per smoker	Background cessation = 1.2% Productivity losses per person		
		One year	Five years	Lifetime
'No intervention'	£0	£532	£2,323	£6,684
'BA' (3%)	£7	£524	£2,283	£6,565
'BA plus self-help material' (4%)	£11	£520	£2,261	£6,499
'BA plus self help material plus NRT' (6%)	£111	£512	£2,217	£6,366
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£123	£476	£2,017	£5,769
'LIC and bupropion' (24%)	£75	£440	£1,825	£5,198
'MIC and bupropion' (31%)	£92	£407	£1,651	£4,679

Table M.2: Net financial benefit, compared to 'no intervention' - Excess absence = 29 hours a cycle, quit rate = baseline after one year

Compared to 'no intervention'	Background cessation = 1.2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA' (3%)	£7	£40	£119	£0	£33	£112
'BA plus self-help material' (4%)	£11	£62	£186	£1	£51	£175
'BA plus self help material plus NRT' (6%)	£19	£106	£318	-£92	-£5	£207
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£56	£306	£915	-£67	£183	£792
'LIC and bupropion' (24%)	£92	£498	£1,487	£17	£423	£1,412
'MIC and bupropion' (31%)	£125	£672	£2,005	£33	£580	£1,914

Table M.3: Net financial benefit, compared to 'BA' - Excess absence = 29 hours a cycle, quit rate = baseline after one year

Compared to 'BA'	Background cessation = 1.2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA plus self-help material' (4%)	£4	£22	£66	-£7	£11	£56
'BA plus self help material plus NRT' (6%)	£12	£66	£199	-£99	-£45	£88
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£49	£266	£796	-£74	£143	£673
'LIC and bupropion' (24%)	£85	£458	£1,367	£10	£383	£1,293
'MIC and bupropion' (31%)	£118	£632	£1,886	£26	£541	£1,794

APPENDIX N

Background Quit Rate is 2%,
Excess Absence = 16 Hours a Cycle,
Costs of the Intervention = Zero

Table N.1: Base case results, quit rate = baseline after one year

	Background cessation = 2%	
	Cost	QALY
'No intervention'	£7,232	11.90
'BA' (3%)	£7,215	11.91
'BA plus self-help material' (4%)	£7,197	11.92
'BA plus self help material plus NRT' (6%)	£7,162	11.94
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£7,002	12.02
'LIC and bupropion' (24%)	£6,850	12.09
'MIC and bupropion' (31%)	£6,712	12.16

Table N.2: Comparing the interventions to 'no intervention', quit rate = baseline after one year

Compared to 'no intervention'	Background cessation = 2%		
	Incremental cost	Incremental QALY	ICER
'BA' (3%)	-£18	0.01	Dominant
'BA plus self-help material' (4%)	-£35	0.02	Dominant
'BA plus self help material plus NRT' (6%)	-£71	0.04	Dominant
'BA plus self-help material plus NRT plus specialist clinic' (15%)	-£230	0.11	Dominant
'LIC and bupropion' (24%)	-£382	0.19	Dominant
'MIC and bupropion' (31%)	-£520	0.26	Dominant

Table N.3: Comparing the interventions to 'BA', quit rate = baseline after one year

Compared to 'BA'	Background cessation = 2%		
	Incremental cost	Incremental QALY	ICER
'BA plus self-help material' (4%)	-£18	0.01	Dominant
'BA plus self help material plus NRT' (6%)	-£53	0.03	Dominant
'BA plus self-help material plus NRT plus specialist clinic' (15%)	-£212	0.11	Dominant
'LIC and bupropion' (24%)	-£365	0.18	Dominant
'MIC and bupropion' (31%)	-£503	0.25	Dominant

Table N.4: Lost productivity - Excess absence = 16 hours a cycle, quit rate = baseline after one year

	Annual cost per smoker	Background cessation = 2% Productivity losses per person		
		One year	Five years	Lifetime
'No intervention'	£0	£297	£1,277	£3,458
'BA' (3%)	£0	£295	£1,265	£3,423
'BA plus self-help material' (4%)	£0	£292	£1,253	£3,389
'BA plus self help material plus NRT' (6%)	£0	£288	£1,228	£3,320
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£0	£267	£1,118	£3,009
'LIC and bupropion' (24%)	£0	£247	£1,012	£2,711
'MIC and bupropion' (31%)	£0	£228	£915	£2,441

Table N.5: Net financial benefit, compared to 'no intervention' - Excess absence = 16 hours a cycle, quit rate = baseline after one year

Compared to 'no intervention'	Background cessation =2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA' (3%)	£2	£12	£35	£2	£12	£35
'BA plus self-help material' (4%)	£5	£25	£69	£5	£25	£69
'BA plus self help material plus NRT' (6%)	£9	£49	£138	£9	£49	£138
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£30	£160	£449	£30	£160	£449
'LIC and bupropion' (24%)	£50	£266	£746	£50	£266	£746
'MIC and bupropion' (31%)	£68	£362	£1,017	£68	£362	£1,017

Table N.6: Net financial benefit, compared to 'BA' - Excess absence = 16 hours a cycle, quit rate = baseline after one year

Compared to 'BA'	Background cessation = 2%					
	Benefit (productivity savings)			Net financial benefit, savings minus the costs		
	One year	Five years	Lifetime	One year	Five years	Lifetime
'BA plus self-help material' (4%)	£2	£12	£35	£2	£12	£35
'BA plus self help material plus NRT' (6%)	£7	£37	£104	£7	£37	£104
'BA plus self-help material plus NRT plus specialist clinic' (15%)	£27	£147	£414	£27	£147	£414
'LIC and bupropion' (24%)	£47	£254	£712	£47	£254	£712
'MIC and bupropion' (31%)	£66	£350	£982	£66	£350	£982