

NICE

**A Rapid Review of:
The Cost-Effectiveness of Workplace Policies
for Smoking Cessation in England**

Draft Report

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Executive Summary

Introduction

The National Institute for Clinical Excellence (NICE) has commissioned four Rapid Reviews on the cost-effectiveness of interventions to assist in smoking cessation. The Rapid Reviews cover the following areas:

- National Health Service (NHS) provided interventions;
- Non-NHS provided interventions;
- Workplace based interventions;
- Mass Media led interventions.

This review assesses the current evidence for the cost-effectiveness of workplace interventions to assist in smoking cessation.

Method

A comprehensive literature review was conducted for studies concerned with the cost-effectiveness of workplace treatments for smoking cessation and how the cost-effectiveness varies with age, sex, level of addiction, previous quit attempts, history of quitting and ethnicity. The cost-effectiveness of stop smoking interventions for pregnant women and routine and manual workers were also examined. A total of 172 titles and abstracts were scanned and full paper copies of 28 studies were assessed for inclusion, with 2 identified as being relevant for this Rapid Review. A further five papers were identified from the other cost-effectiveness Rapid Review searches (a further three papers were identified from one of these papers and included in the review). Some of the seven papers were identified during the NHS, workplace and mass media literature searches). Data were extracted from the studies and tabulated onto evidence tables (Section 6).

Results

Overall there was limited information concerning the cost-effectiveness of workplace policies aimed at smoking cessation. Ten studies were included in the review. Seven of these were obtained in the original search, and the other three were identified from one of the systematic reviews. There were three cohort studies, two surveys, three randomised controlled trials (RCTs), one economic analysis and one systematic review. Studies were carried out in the US, Australia and the UK.

There was some evidence that workplace interventions are cost-effective (two 1+ studies, one 2- study and one 2++ study). There was evidence to suggest that, from employer's perspective, bupropion is a cost-beneficial smoking cessation intervention, whether provided with or without counselling [1; 2]. A nicotine patch with a pharmacist's smoking cessation consultation and patient participation in a formal smoking cessation programme (it is not clear who delivered the programme) was shown to provide the greatest net benefit for employers, where the costs and benefits applied to all patients included in the study [3].

A large systematic review carried out by the Cochrane collaboration group concluded that, whilst the effectiveness evidence for workplace interventions was strong, there was limited literature concerning the cost-effectiveness of workplace smoking cessation programmes [4]. Smoking cessation interventions which have been found to be effective are generally cost-effective when delivered in the workplace.

A 2+ study [5] carried out an investigation regarding the cost to employers of smoking in the workplace in Scotland. They found that the cost to all employers in Scotland was in the region of £450 million as a result of lost productivity; £40 million from higher rates of absenteeism among smokers, and £4 million as a result of fire damage. However, this estimate of productivity loss was highly dependent on the assumptions made.

A 2- study [6] investigated the effect of insurance coverage on the demand for, and the use of, smoking cessation services. All plans include NRT and a behavioural programme named 'Free and Clear'. The costs of the standard (50% co-payment for behavioural therapy and small contribution to NRT), reduced (50% co-payment for behavioural therapy and NRT) and flipped (no co-payment for the behavioural therapy and 50% co-payment for NRT) coverage were similar but the cost to the plan per user who quit smoking was about 50% greater with full coverage than with the other plans.

Evidence Statements

The results of the evidence, discussed in Section 4, are summarised in the evidence tables below. These are the key findings only and further details are provided in Section 4.

No	Statement	Grade	Evidence (Cross referencing page in evidence tables and page in text)	Author
	Overall there was limited information concerning the cost-effectiveness of workplace interventions.			
1	There was some evidence that workplace interventions are cost-effective.	Two 1+ study, one 2- study and one 2++ study.	Pages 8 to 11.	Javitz <i>et al.</i> 2004 McGhan 1996 Bertera <i>et al.</i> 1990 Nielsen and Fiore 2000
2	There was evidence to suggest that from employer's perspective bupropion is a cost-beneficial smoking cessation intervention, when provided with or without counselling.	One 1+ study and one 2++ study.	Pages 9 to 10.	McGhan 1996 Nielsen and Fiore 2000
3	Nicotine patch with pharmacists smoking cessation consultation and patient participation in a formal smoking cessation programme has been shown to provide the greatest net benefit for employers, where the costs and benefits apply to all patients included in the study.	One 1+ study.	Page 10.	McGhan 1996
4	A large systematic review carried out by the Cochrane collaboration group concluded that, whilst the effectiveness evidence for workplace interventions was strong, there was limited evidence concerning the cost-effectiveness of workplace smoking cessation programmes.	1++ (included were one 1++ study, one 1+ study and one 2++ study).	Page 11.	Moher and Lancaster 2005 (Erfurt <i>et al.</i> 1991, Jeffery <i>et al.</i> 1993, Borland <i>et al.</i> 1990)

Section 1: Introduction

1.1 BACKGROUND

NICE is undertaking a series of Rapid Reviews on the evidence to support smoking cessation treatments. This is to identify the optimal provision of smoking cessation services to all smokers and, in particular, to specific population groups (i.e. manual working groups, pregnant smokers and hard to reach communities). This will also contribute towards guidance on the provision of smoking cessation treatment. The Rapid Reviews are being undertaken on the following areas:

- National Health Service (NHS) provided interventions;
- Non-NHS provided interventions;
- Workplace based interventions;
- Mass Media led interventions.

This study presents the review of the evidence of the cost-effectiveness of workplace treatments for smoking cessation.

1.2 SELECTION OF INTERVENTIONS TO REVIEW

The selection of papers to review was based on the review of the effectiveness of workplace policies that precedes this report. The scope was defined by Bell *et al.*¹ 2006 as:

'The review was international in scope and included workplace smoking policies and workplace smoking cessation intervention aimed at the workforce. Policies of interest ranged from total indoor bans to total grounds bans on smoking in the workplace. Interventions of interest were those provided in the workplace. All types of intervention were considered, such as group therapy, individual counselling, self-help materials, and nicotine replacement therapy (NRT).'

Our rapid review aims to critically analyse the cost-effectiveness evidence for the above interventions.

¹ Bell, K; McCullough, L; DeVries, K; Greaves, L; Jategankar, N. NICE rapid reviews. Workplace policies for smoking cessation. British Columbia Centre for Excellence for Women's Health. First draft, August 2006.

Section 2: Research Questions

2.1 QUESTION 1

What is the cost-effectiveness of workplace interventions for smoking cessation?

2.2 SUB QUESTIONS

- How does the cost-effectiveness vary with:
 - Age?
 - Sex?
 - Level of addiction?
 - Previous quit attempts?
 - History of quitting?
 - Ethnicity?
- What is the cost-effectiveness of stop smoking interventions in the workplace for pregnant women?
- What is the cost-effectiveness of stop smoking interventions in the workplace for routine and manual workers?

Section 3: Methodology

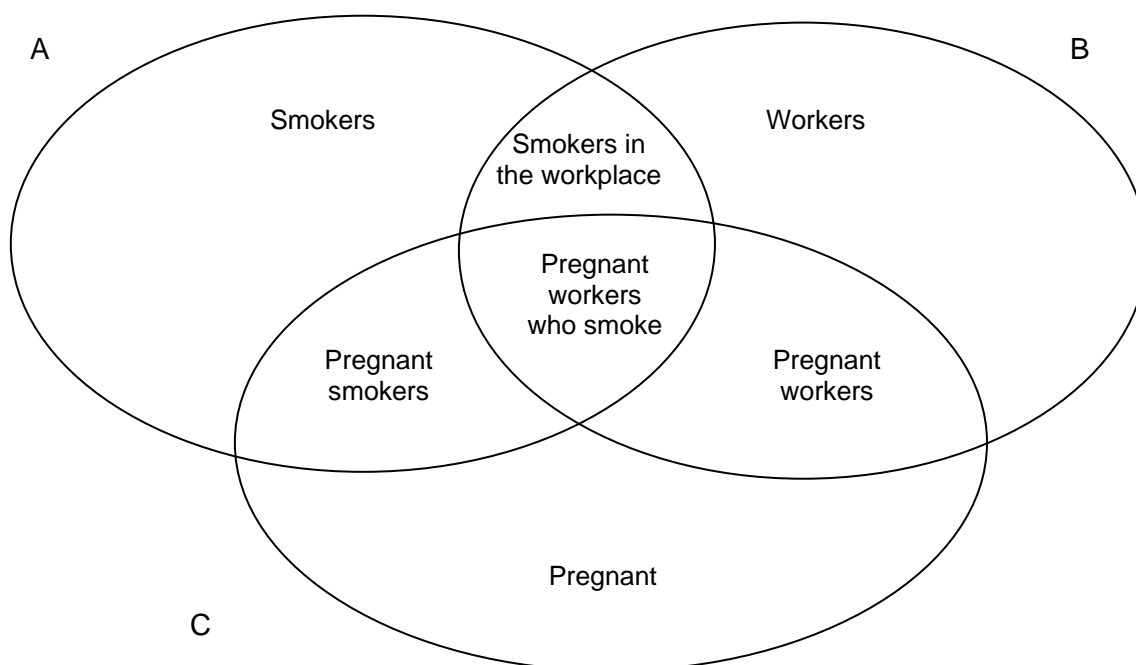
3.1 DATA SOURCES AND SEARCH STRATEGIES

The following information sources were searched:

- NHS Economic Evaluation Database (NHS EED);
- Centre for Reviews and Dissemination (CRD) internal database;
- The results of the original effectiveness review.

The search strategies are shown in Section 8. Pregnant women and manual workers were not included as a specific search terms. However, papers concerning these groups would have been identified by the search undertaken. This can be demonstrated by using a simple example, see Figure 1.1. Here 'A' and 'B' represent the search undertaken for workplace smokers. It can be seen that this search will have identified all smokers, including pregnant smokers. If the search term had specified pregnant smokers the search strategy would have only identified pregnant workers who smoke (the middle section of Figure 1.1).

Figure 1.1: Pregnant women search strategy



The data were extracted from the studies and tabulated into the evidence table, (see Section 6). Data on participants, study design and outcomes and cost-effectiveness were extracted.

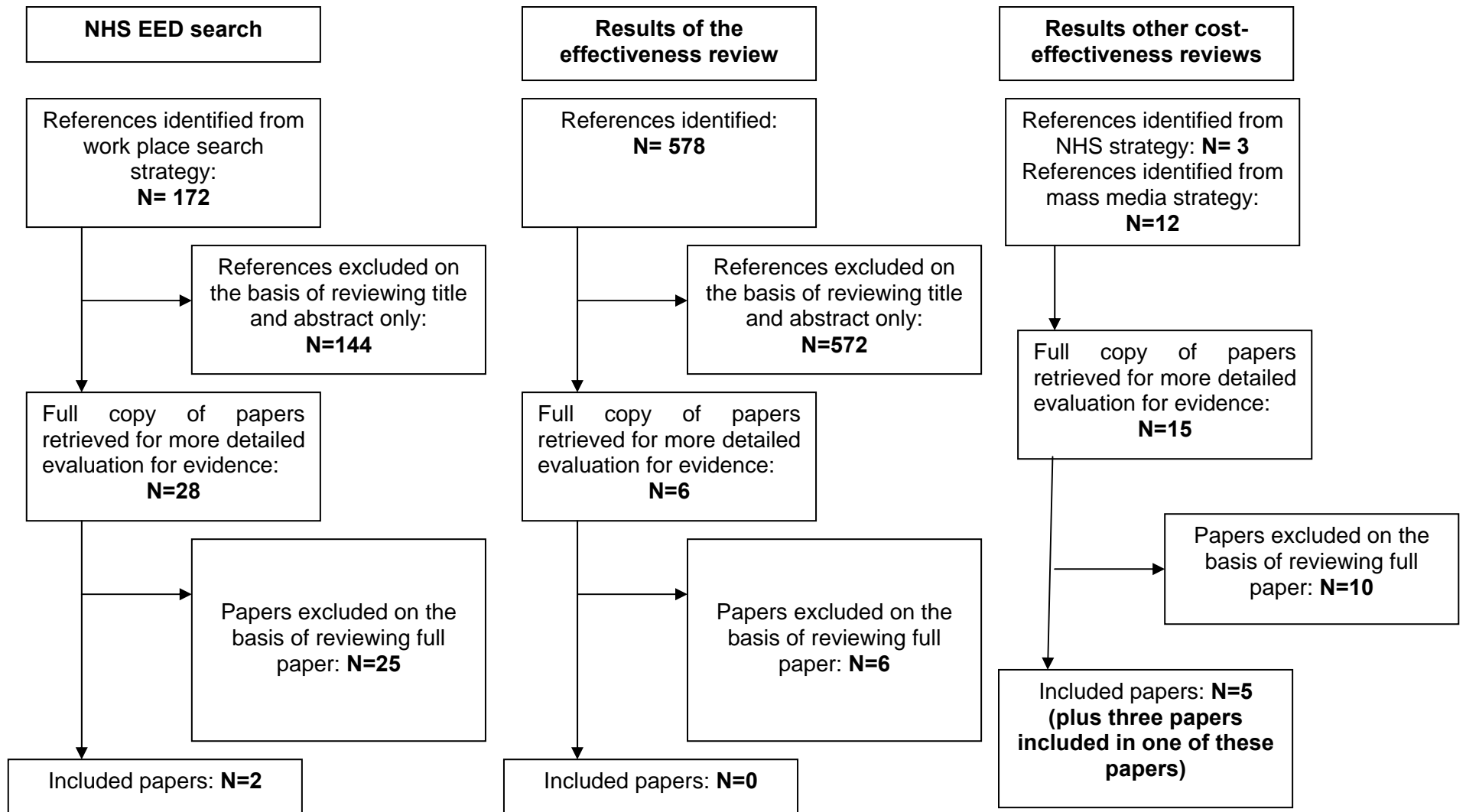
3.2 PARAMETERS FOR REVIEW

The criteria for inclusion of papers in this review were:

- Studies were required to have a defined intervention to assist smoking cessation;
- The study population was smoking at the start of the study (although if drawn from a general population it is accepted that some may not smoke);
- Studies were included if they reported both the costs and effectiveness of an intervention to assist smoking cessation (although costs and effectiveness were not necessarily required to have been combined into a single cost-effectiveness ratio).

3.3 STUDY FLOW

A flow diagram detailing the fate of the initial studies identified from the database search is shown below. The searches identified 34 potentially relevant references. On the basis of reviewing the title and abstract, seven full text papers were obtained for further assessment, with a further three papers identified in one of the systematic reviews.



3.4 QUALITY APPRAISAL

All of the studies that met the inclusion criteria were rated by two independent reviewers in order to determine the strength of the evidence. Once the research design was determined (using the NICE algorithm), studies were addressed for their methodological rigour and quality based on the critical appraisers' checklists provided in Appendix B of the Public Health Guidance Methods Manual (see Table 3.1). Each study was categorised by study type and graded using a code '++', '+' or '-', based on the extent to which the potential sources of bias had been minimised. Health economic appraisal forms for the included papers are shown in Appendix A. **(to follow)**

Table 3.1: Level and quality of evidence

Type and quality of evidence	
1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs (including cluster RCTs) with a very low risk of bias
1+	Well conducted meta-analyses, systematic reviews of RCTs, or RCTs (including cluster RCTs) with a low risk of bias
1-	Meta-analyses, systematic reviews of RCTs, or RCTs (including cluster RCTs) with a high risk of bias
2++	High quality systematic reviews of these types of studies, or individual, non- RCTs, case-control studies, cost benefit analysis (CBA) studies and correlation studies with a low risk of confounding, bias or chance and a high probability that the relationship is causal
2+	Well conducted non-RCT, case control studies, cohort studies, CBA studies, ITS and correlation studies with a low risk of confounding, bias or change and a moderate probability that the relationship is causal
2-	Non-RCTs, case control studies, cohort studies, CBA studies, ITS and correlation studies with a high risk – or chance – of confounding bias, and a significant risk that the relationship is not causal
3	Non- analytic studies (for example, case reports, case series)
4	Expert opinion, formal consensus
Grading the evidence	
++	All or most of the quality criteria have been fulfilled. Where they have been fulfilled the conclusions of the study or the review are though very unlikely to alter
+	Some of the criteria have been fulfilled. Where they have been fulfilled the conclusions of the study or the review are thought unlikely to alter
-	Few or no criteria fulfilled. Where they have been fulfilled the conclusions of the study or the review are thought unlikely to alter

3.5 SYNTHESIS

Due to the heterogeneity of design among the studies, a narrative synthesis was conducted.

3.6 CURRENCY CONVERSION

In order to allow direct comparison of studies all results have been adjusted and converted from local currencies to UK £2006 prices. This was done via a two step process:

- First costs were converted to British pounds using a historical conversion rate (<http://www.oanda.com/convert/fxhistory>);
- The costs were then inflated to January 2006 pounds (<http://www.statistics.gov.uk/statbase/tsdataset.asp?vlnk=229&More=>).

All costs in section 4 are first reported as they appear in the original study with the British 2006 pounds in brackets next to them.

Section 4: Summary of Findings

Overall there is limited information concerning the cost-effectiveness of workplace policies aimed at smoking cessation. All studies included in this review are summarised in the evidence tables in Section 6.

4.1 QUESTION 1: WHAT IS THE COST-EFFECTIVENESS OF WORKPLACE TREATMENTS FOR SMOKING CESSATION IN ENGLAND?

Ten studies were included in the review. Two were obtained from the workplace cost-effectiveness searches, five from the other cost-effectiveness searches, and three were identified in one the later systematic reviews. There were three cohort studies, two surveys, three randomised controlled trials (RCTs), one economic analysis and one systematic review. Studies were carried out in the US, Australia and the UK.

4.1.1 Workplace interventions

Four papers investigated workplace smoking cessation interventions (two 1+ studies, one 2++ and one 2+ study). These papers were concerned with stopping smoking in a large office complex where employees were given the opportunity to pay for a self-help kit or attend a six-week clinic and the interventions that included counselling and nicotine replacement therapy (NRT).

In an eighteen-month follow-up study, Bertera *et al.* 1990 [7] (2-) aimed to undertake a cost analysis of the stop smoking clinic and self-help kit provided in the work environment described above (using 1990 dollars). Participants included 1,400 employees from a large office complex. All employees (smokers and non-smokers) were invited to attend a stop smoking programme orientation meeting. A number of presentations were given by a health educator and a representative of the local American Lung Associate during lunchtimes. At the end of the meetings, employees were encouraged to register for either a self-help or clinic smoking cessation intervention. 70 employees paid for the self help kit or attended a six week clinic. Details of the interventions were as follows:

- The self-help kit consisted of:
 - A quit manual;
 - A maintenance manual;
 - An audio cassette on deep muscle relaxation and other stress management techniques.
- The clinic aimed to:
 - Aid progression from awareness of smoking habits to actual behavioural change;
 - Show how to change behaviour using activities and assignments.

The results of the study are shown in Table 4.1 both groups resulted in a reduction in the number of cigarettes smoked each day and the clinic intervention resulted in a higher percentage of quitters. Whilst the cost per participant was higher for the clinic-based group

the cost quitter was similar for both groups. The authors commented that employees should be offered the choice of smoking cessation interventions. The applicability of this paper to the current situation in the UK is limited by its age (published in 1990) and its location (US).

Table 4.1: Results of the Bertera study (1990 dollars (UK £2006))

	Cigarettes smoked per day		Percentage of quitters at 18 months (%)		Cost per participant		Cost per successful quitter	
	Clinic group	Self help group	Clinic group	Self help group	Clinic group	Self help group	Clinic group	Self help group
Baseline	26.7	28.4	20.9	11.1	\$32.10	\$16.61	\$153.89	\$149.50
Follow up	17.9	20.3			(£29.37)*	(£15.14)	(£140.31)	(£136.31)

*Note these are 1990 dollars and 2006 pounds

Javitz *et al.* 2004 [2] (1+) assessed the return on investment from an employer's perspective of four different smoking cessation programmes (using 2002 dollars). Costs of the behavioural interventions were based on the amount and type of personnel time involved, local wage rates and overhead benefits, facility costs, time spent on indirect tasks related to the ongoing smoking cessation behavioural programmes, telephone costs, management costs, printing and postage. Drug costs were based on contract pricing, pharmacy dispensing costs and allocable pharmacy overheads. The four programmes used are shown in Table 4.2, were two different bupropion regimes were crossed with two different counselling approaches.

Table 4.2: Smoking cessation programmes used in the Javitz study

	Bupropion 150 mg	Bupropion 300 mg
Less intensive counselling	150 mg Bup + LIC	300 mg Bup +LIC
More intensive counselling	150 mg Bup + MIC	300 mg Bup + MIC

The less intensive counselling was based on the Zyban Advantage Plan (ZAP), where participants received personalised intervention material, a five to ten-minute scripted call after the quit date and access to a 24-hour automated toll free support line. More intensive counselling was based on the Free and Clear (FC) telephone programme, where participants received self-help material plus support materials for family and friends, an in depth phone assessment and counselling, four prescheduled follow-up calls and access to a toll free number. Medication was given for eight weeks and counselling lasted up to one year.

Participants were members of Group Health Cooperative (GHC), a non-profit consumer-governed healthcare system with its headquarters in Seattle, US. The study was advertised to members via publications mailed to the GHC members. Primary care physicians were also informed of the study and were asked to refer eligible patients. Of the 2,979 smokers interested 1,909 were deemed eligible for the study with 1,524 were included in the final study. Smoking status was assessed at 12 months. Table 4.3 shows the results of the study. 150mg bupropion was shown to be more effective than the higher dose and that more intensive counselling interventions should be favoured. The authors commented that

employers can expect to receive positive rates of return on investment from sponsoring smoking cessation programmes.

Table 4.3: Results of the Javitz et al. 2004 study (2002 dollars (UK £2006))

Intervention	1-year cessation	Total costs per employee	1-year cost per additional non-smoker	5-year benefit to employer per employee	Net benefit to employer per employee	Internal rate of return per year
150 mg Bup + LIC	23.6%	\$119 (£88)	\$944 (£702)	\$472 (£351)	\$353 (£262)	31.7%
150 mg Bup + MIC	31.4%	\$195 (£145)	\$956 (£711)	\$764 (£568)	\$569 (£423)	31.4%
300 mg Bup +LIC	25.7%	\$207 (£154)	\$1,408 (£1,047)	\$550 (489)	\$343 (£255)	21.6%
300 mg Bup + MIC	33.2%	\$283 (£210)	\$1,275 (£948)	\$832 (£619)	\$548 (£407)	24.1%

McGhan 1996 [3] (1+) compared several smoking cessation interventions in terms of the costs and benefits from an employer's perspective (using 1994 dollars). Details of the interventions studied are provided in Table 4.4. The intervention that resulted in the greatest net benefit the nicotine patch with pharmacists smoking cessation consultation and patient participation in a formal smoking cessation programme. Costs were adjusted to 1994 dollars. The costs and benefits applied to all patients included in the study. The economic benefit of a non-smoking workforce was \$1,483 (£1,326) and was taken from the literature. This is the annual cost to the employer for an employee who smokes and includes the following costs:

- Absenteeism at \$173 (£155);
- Medical care at \$716 (£640);
- Morbidity or early mortality (discounted lost earnings) at \$235 (£210);
- Lost productivity at \$359 (£321).

Table 4.4: Interventions included in the McGhan study (1994 dollars (UK £2006))

Intervention	≥ 6 month quit rates (taken from the literature)	Cost of the intervention (\$)	Net financial benefit from the employers perspective (\$)*	Net benefit to employers of the intervention (\$)**
Self-care	15% (CI 3 to 27)	26 (£23)	1,457 (£1,303)	196 (£175)
Five-day behavioural programme	26% (CI 14 to 38)	148 (£132)	1,335 (£1,194)	267 (£239)
Group withdrawal clinic	30% (CI 15 to 45)	Not reported	Not reported	Not reported
Nicotine patch and weekly group counselling	26% (CI 22 to 31)	203 (£182)	1,280 (£1,145)	183 (£164)
Nicotine patch and weekly individual counselling	20% (CI 18 to 23)	203 (£182)	1,280 (£1,145)	94 (£84)
Nicotine patch and no counselling	15% (CI 11 to 17)	128 (£114)	1,355 (£1,212)	94 (£84)
Nicotine patch and pharmacist	31% (CI not provided)	203 (£182)	1,280 (£1,145)	257 (£230)
Nicotine patch, pharmacist consultation, and comprehensive behavioural programme	44% (CI not provided)	351 (£314)	1,132 (£1,012)	302 (£270)

* The economic benefit of a non-smoking workforce (\$1,483) minus the cost of the intervention.

** Calculated as: (the percentage who quit * net financial benefit) – (percentage who don't quit * cost of the intervention).

Nielsen and Fiore 2000 [1] (2++) carried out a cost-benefit analysis of four interventions to reduce smoking (using 1998 dollars). The analysis was undertaken from the employer's perspective. The costs, probabilities (quit rates) and benefits used in the model were drawn from the results of a double-blind placebo-controlled clinical trial. Details of the interventions studied and the net benefit in the first year post quit are shown in Table 4.4. A net benefit of \$1,654 (£1,211) per successful quitter was assumed (based on the McGhan study discussed earlier). All the interventions resulted in a positive net benefit; bupropion alone was the most cost-beneficial.

Table 4.5: Interventions included in the Nielsen and Fiore paper (1998 dollars (UK £2006))

Intervention	Number of subjects	One year quit rate (%)	Drug costs (\$)	Net benefit in the first year post quit (\$) (per employee)	Calculation of net benefit
Bupropion sustained release (SR)	244	30.3	163.49 (£120)	338 (£247)	$[0.303 \times (1,654 - 163.49)]$ + $[0.697 \times (0 - 163.49)]$
NRT	244	16.4	245.22 (£179)	26 (£19)	$[0.164 \times (1,654 - 254.22)]$ + $[0.836 \times (0 - 245.22)]$
Bupropion and NRT	245	35.5	408.71 (£299)	178 (£130)	$[0.355 \times (1,654 - 408.71)]$ + $[0.645 \times (0 - 408.71)]$
Placebo (minimal counselling without pharmacotherapy)	160	15.6	NA	258 (£189)	$[0.156 \times (1,654)]$

Sensitivity analysis substituted the quit rates for values at the top and bottom of the 95% confidence interval. This only had an effect when bupropion and placebo were compared. If the true value of the quit rate, for placebo, was above 20.4% (with bupropion held constant) then placebo would be more cost-beneficial. Similarly, if the true quit rate for bupropion SR was less than 25.5 (with placebo held constant) then placebo would be more cost-beneficial. None of the results were significantly affected by the costs assumptions used within the model. Within this study the employer would bear the cost of treatments for each quit attempt, but the benefits would only be gained for the successful quitters. From an employer's perspective (taking only drug costs into account) bupropion was the most cost-beneficial smoking cessation intervention. The authors commented that the quit rates may overestimate the rates that would be obtained in real life settings. Would-be quitters (who attempted and failed several times before quitting) were not included in the model.

4.1.2 Cochrane review into workplace interventions for smoking cessation

Moher and Lancaster, 2005, [4] (1++) carried out a systematic review with the aim of determining the extent to which workplace smoking cessation interventions stopped or reduced smoking. The review focussed on studies that included adults over 18 years, who were in employment and who smoked. The following types of interventions were investigated:

- Group interventions aimed at the individual to promote smoking cessation. Interventions were included that did not modify the workplace as a whole but did include behavioural interventions for the individual, self-help materials, advice from a health professional or pharmacological treatments;
- Interventions aimed at the workplace as a whole, which included workplace tobacco control policies and bans, social support for not smoking, environmental support for not smoking, incentive, and comprehensive workplace programming.

The authors reported that the evidence of the effectiveness of group therapy, individual therapy and pharmacological treatments was strong when compared to minimal or no intervention. Self-help material was less effective. Tobacco bans were shown to reduce cigarette consumption during the day but the authors note that their effect on overall consumption was less clear. The authors did not detect increased cessation rates from adding social and environmental support to the interventions. Competitions and incentives did increase attempts to stop smoking but there was less evidence of the actual rate of quitting. The authors concluded that:

- The evidence for interventions aimed at the individual was strong, but self help interventions were less effective. It does not matter whether individual interventions were offered in the workplace or elsewhere;
- There was limited evidence concerning the effectiveness of competitions and incentives organised by the employer;
- Smoking bans did decrease consumption during the day;
- There was a lack of evidence concerning the comprehensive intervention's effect on cessation;
- There was a lack of evidence surrounding the cost-effectiveness of workplace smoking cessation programmes.

The review identified six studies that carried out economic analyses. The full papers for three of the studies have been obtained and are discussed here [8-10]. The results of the further papers are taken from the Moher study [11-13].

Borland *et al.* 1990 [10] (2+) carried out a survey to examine the impact of a smoking ban in the Australian Public service. The ban was announced a year before it came into effect, with publicity, pre-deadline phasing-in of restrictions at some worksites, and smoking cessation programmes available before the ban. A questionnaire was sent to participants two to four weeks before the ban and five to six months afterwards. The questionnaire required smokers to estimate the number of cigarettes smoked during the following time periods:

- On workdays and non-workdays;
- In the last 24 hours, divided into:
 - Before work;
 - While working indoors;
 - While working outdoors;
 - During coffee breaks;
 - At lunch time;
 - The hour after work;
 - In the rest of the evening.
- Questions regarding attitudes to smoking and smoking bans were asked, although these data are reported elsewhere;
- The questionnaire did not cover quit attempts.

The results showed:

- Of the 2,113 people in the sample, 23.3% were smokers at the initial survey and 22.3% were smokers at follow up (a reduction of 21 people);
- 57 smokers at the time of initial survey had quit at follow-up, 36 previous non-smokers (it is not clear as to whether these were previous non-smokers or previous ex-smokers) were smoking at follow-up;
- Following the ban:
 - The mean reduction in cigarettes was 5.2 per day;
 - Consumption of cigarettes was reduced for moderate smokers (by 5.8 cigarettes per day) and for heavy smokers (7.9 cigarettes per day);
 - Smoking whilst working was reduced by 7 cigarettes per day, but smoking outside the home increased by 0.7 cigarettes per day.

The authors extrapolated the results to the entire Australian Public Service and estimated that 24.7% of the 170,000 public servants were current smokers. Using the reduction of 5.2 cigarettes per day, the ban would result in a reduction of 52 million cigarettes per year. This equates to AUS\$5.2 million (roughly the same in British pounds) each year in relation to tobacco sales.

Two papers by DePaul were discussed in the Cochrane review. The major publications (Jason *et al.* 1989 [12] and Jason *et al.* 1995 [13]) for these papers could not be obtained in the time available and the results are, therefore, taken from the Cochrane review. DePaul 1989 conducted a cluster randomised trial by worksite (the study was carried out in 1987 and this has been used as a proxy for the cost year). 479 employees at 38 worksites were recruited before a three week television smoking cessation programme was undertaken. 206 people were allocated to the intervention and 213 to the control. Six weekly meetings were held that coincided with the television smoking cessation programme and followed by monthly meetings for one year. Smokers who were abstinent at the final group meeting and the 12-month follow up were entered into a lottery. The intervention resulted in 44 quitters at 12 months (21%), compared to 26 for the control (12%). The intervention cost \$21,000 (£17,595) for incentives and supplies, equating to \$477 (£4000) per quitter. The control

group option cost \$2,000 (£1,676) for supplies or \$77 (£64) per quitter. All costs were reported in US dollars.

The 1994 DePaul study was again conducted using a cluster randomised trial by worksite. 844 smokers were recruited. The study was similar to the 1984 paper and worksite intervention was timed to coincide with a mass media intervention with a complementary newspaper supplement. The year that the intervention was provided is unclear and all costs have been assumed to be 1994 costs. Details of the interventions are as follows:

- Self help manual (289 participants);
- Self help and an incentive payment of \$1 for each day abstinent up to \$175 (£157) (281 participants);
- Six group meetings over three weeks followed by 14 booster meetings over six months. Incentive payments and the self help manual were also provided (283).

The total costs and cost per quitter of each intervention are shown in Table 4.6. The cost of the programme offered to the general public (for 50,000 self-help manuals and newspaper supplements) was \$62,500 (£55,899) and if 5-15% of people who received the self-help manuals stopped smoking, then the cost would be \$8-\$25 (£7 - £22) per quitter. The television series cost approximately \$20,000 (17,888) and if 5% of those who watched it quit, then the cost per quitter would be \$3 (£3). Incremental analysis was not presented in the paper.

Table 4.6: Total cost and cost per quitter from DePaul 1994 (1994 dollars (UK £2006))

Intervention	Total cost (US\$)*	12 month continuous quit rate (%)	Cost per quitter (US\$)
Self-help	4,717 (£4,219)	5.1	225 – 1,179 (£201 – £1,054)
Incentives	6,992 (£6,254)	11.0	250 – 699 (£224 - £625)
Group	26,867 (£24,029)	31.2	455 – 790 (£407 – 707)

*Total costs were based on the staff costs (group leaders, training and supervision), incentives and manual.

Erfurt *et al.* 1991 [8] (1++) aimed to determine the cost-effectiveness of a worksite wellness programme aimed at reducing three cardiovascular disease (CVD) risks for employees at three manufacturing plants and at a control plant. The CVD risks were hypertension, obesity and cigarette smoking. This paper was published in 1991 and is not directly related to a smoking cessation intervention and, therefore, may not be applicable to the current UK setting. Four manufacturing plants were randomly assigned to one of the following wellness programmes:

- Control;

- Health education site: an active wellness committee used newspaper articles, health fairs, sign-up tables and flyers to attract participation into weight loss and smoking cessation classes offered at least twice a year (health education site);
- Health education and follow-up counselling site: counselling included one-to-one guided self-help, formal consultation classes, mini group interventions and full group classes (health education and follow-up counselling site);
- Health education, follow-up counselling and plant organisation site: in addition to the above health communication networks were created (health education, follow-up counselling, and plant organisation site).

The key results of the study are shown Table 4.7. The total direct cost per percentage of risks reduced and smoking relapse prevented were less than one US dollar per employee per year, for all four interventions. The bottom two sites, in the table, were the only sites that showed any substantial incremental effectiveness beyond the control. The cost year is unclear, although it seems that the control refers to 1985, health education site to 1986, the Health education and follow-up counselling site to 1987 and the Health education, follow-up counselling, and plant organisation site to 1988 (these years have been used for the cost conversion).

Table 4.7: Results from Erfurt 1991

Wellness programme	Average annual cost per employee (\$)	Percentage of high level of CVD risks/relapse reduced (%)*	Percentage of moderate level of CVD risks/relapse reduced (%)**	Percentage reduction of risks per annual cost per employee (%)	Percent risk reduction per \$ spent (%)	Cost per 1% absolute reduction of risks (\$)
Control site	2.97 (£4.91)	34	40	13.47 (40/2.97)	-	-
Health education site	19.68 (£27.01)	35	41	2.08 (41/19.68)	0.07	No substantial incremental effectiveness beyond the control
Health education and follow-up counselling site	30.96 (£38.13)	44	51	1.65 (51/30.96)	0.36	0.61 (£0.76) (30.96/50)
Health education, follow-up counselling, and plant organisation site	38.31 (£43.34)	46	56	1.46 (56/38.31)	0.34	0.68 (£0.77) (38.31/56)

* High levels of CVD risk are blood pressure maintained below 140/90 mmHg or a sustained weight loss of ten pounds or more.

** Moderate levels of CVD risk are blood pressure maintained below 160/95 mmHg or a sustained weight loss of three pounds or more.

Jeffery *et al.* 1993 [9] (1+) reported the results of a large scale RCT, the *Healthy Worker Project*. The intervention involved on-site classes, held in the employee's time, and an incentive system organised through payroll deduction. There were four rounds of classes over the two years, each round consisting of 11 classes. The classes were aimed at weight loss and smoking cessation and were led by professional health educators who were paid for by the study. Over the two years, 43% of smokers quit. The total cost of the smoking intervention was \$1,500 (\$30 per session in instructor time plus the cost of the materials) (£1,401 or £28 per session, using the year of publication, 1993, as the cost year). The authors estimated the intervention can be economically justified if between 8 and 16 people quit per workplace. The treatment group had a mean of 597 employees, 24.4% of whom smoked. The control group had a mean of 645 employees, 24.7% of whom were smokers.

The results of Windsor 1989 are discussed in the Cochrane review. Details of this study are taken from the Cochrane review, since the major publication for this study is Windsor *et al.* 1988 [11], which could not be obtained by our reviewers in the time available. Windsor investigated a University's employer voluntary quit smoking programme. The cost year used in the study is unclear but it appears to have been carried out in 1984. 378 smokers were randomised into one of the following groups:

- 'Brief advice', a ten minute brief advice session plus self help manuals;
- 'Brief advice plus skills training', a ten minute brief advice session plus self help and another counselling session (lasting 20 – 30 minutes) with skills training, buddy selection and a contract;
- 'Brief advice plus incentive', a ten minute brief advice session plus self help manuals plus monetary awards for cessation;
- 'Brief advice plus monetary rewards for cessation', a ten minute brief advice session plus self help and another counselling session (lasting 20 – 30 minutes) with skills training, buddy selection and a contract plus monetary rewards for cessation.

The results showed that the total cost of each programme (cost to deliver the programme and the lost employee time to participate) was \$50 (£84) per employee. The authors report that:

- For 'brief advice' and 'brief advice plus incentive' combined;
 - Implementation cost was \$9,500 (£15,911) ($\$50 * 190$, the number of participants);
 - Estimated saving to the university, with a 5.8% quit rate was \$9,000 (£15,074) (9 quitters at \$1,000 each);
- For 'brief advice plus skills training' and 'brief advice plus monetary rewards for cessation' combined;
 - Implementation cost was the same for groups as above \$9,500 (£15,911);
 - Estimated saving to the university, with a 15% quit rate was \$27,000 (£45,221) (27 quitters at \$1,000 each).

4.1.3 The cost to employers of smoking in the workplace

Although not focussed on cost-effectiveness, Parrott and Godfrey, 2000, [5] (2+) carried out a telephone survey to estimate the cost to employers of smoking in the workplace in Scotland (using 1998 British pounds). The aim was to highlight the potential gains from smoking cessation provision. 200 Scottish workplaces were surveyed. Workplaces were included if they employed more than 50 people. The national cost of employee smoking in Scotland was in the region of £450 (£616) million per year as a result of lost productivity, £40 (£55) million from higher rates of absenteeism among smokers and £4 (£5) million as a result of fire damage. However, this estimate of productivity loss was highly dependent on the assumptions made, namely:

- That at worksites with smoke rooms, 30 minutes would be lost each day, per smoker, due to smoking (assuming that five cigarettes are smoked a day, taking six each) [14];
- That at worksites which are smoke free or have no policy 10 minutes a day would be lost per smoker [14];
- 53% of buildings would have smoke rooms, 34% would be smoker free and 7% would have no policy (assumption).

4.1.4 Insurance coverage for smoking cessation interventions

Curry *et al.* 1998 [6] (2-) investigated the effect of insurance coverage on the demand for, and the use of, smoking cessation services. The cost year appears to that of 1994. Four types of insurance coverage were compared, where employees were not allowed to select their own coverage. All plans include NRT and a behavioural programme named 'Free and Clear'. The four types of coverage were:

- Standard coverage with 50% co-payment for behavioural therapy and \$5 per NRT prescription;
- Reduced coverage with 50% co-payment for both the behavioural therapy and NRT;
- Flipped coverage with no co-payment for the behavioural therapy and 50% co-payment for NRT;
- Full coverage with full coverage for both behavioural therapy and NRT.

The study population included all adults (aged 18-64) enrolled on the Group Health Cooperative (GHC) in Washington. The standard coverage group included 26,983 adults; the reduced coverage group included 34,455 adults; flipped coverage included 10,068 adults; and the full coverage includes 18,499 adults. The results of the cost-effectiveness analysis are shown in Table 4.8. The cost to the health plan was similar for the standard, reduced and flipped levels of coverage, and was about 50% greater with the full coverage.

Smoking cessation rates and cost per benefit user who stopped smoking (1994 dollars (UK £2006))*

Coverage	Cessation rate among benefit users	P value (compared to standard)	Average cost per quitter		
			Total	Cost to user	Cost to health plan
Standard	38%		\$928 (£830)	\$130 (£116)	\$797 (£713)
Reduced	31%	0.23	\$1,127 (£1,008)	\$326 (£292)	\$801 (£716)
Flipped	33%	0.68	\$1,036 (£927)	\$166 (£148)	\$870 (778)
Full	28%	0.09	\$1,192 (£1,066)	\$21 (£19)	\$1,171 (£1,047)

*Table adapted from Curry.

4.2 SUB QUESTIONS

The papers identified did not provide information concerning age, gender, ethnicity or the cost-effectiveness of workplace smoking cessation policies or interventions.

Section 5: Overview

5.1 OVERVIEW

Overall there is limited information concerning the cost-effectiveness of workplace policies aimed at smoking cessation. Ten studies were included in the review. Two were obtained from the workplace cost-effectiveness searches, five from the other cost-effectiveness searches, and three were identified in one of the later systematic reviews. There were three cohort studies, two surveys, three randomised controlled trials (RCTs), one economic analysis and one systematic review. Studies were carried out in the US, Australia and the UK.

There was some evidence that workplace interventions are cost-effective (two 1+ studies, one 2- study and one 2++ study). There was evidence to suggest that, from an employer's perspective, bupropion is a cost-beneficial smoking cessation intervention, when provided with or without counselling [1; 2]. A nicotine patch with a pharmacist's smoking cessation consultation and patient participation in a formal smoking cessation programme was shown to provide the greatest net benefit for employers, where the costs and benefits applied to all patients included in the study [3].

A large systematic review carried out by the Cochrane collaboration group concluded that, whilst the effectiveness evidence for workplace interventions is strong, there was limited evidence concerning the cost-effectiveness of workplace smoking cessation programmes [4].

A 2+ study [5] carried out an investigation regarding the cost to employers of smoking in the workplace in Scotland. They found that the cost to all employers in Scotland was in the region of £450 million as a result of lost productivity; \$40 million from higher rates of absenteeism among smokers, and £4 million as a result of fire damage. However, this estimate of productivity loss was highly dependent on the assumptions made.

A 2- study [6] investigated the effect of insurance coverage on the demand for, and the use of, smoking cessation services. All plans include NRT and a behavioural programme named 'Free and Clear'. The costs of the standard, reduced and flipped coverage were similar but the cost to the plan per user who quit smoking was about 50% greater with full coverage than with the other plans.

Section 6: Evidence Tables

6.1 EVIDENCE TABLES

Evidence of Cost-Effectiveness									
First author	Study design	Research Type	Research Quality	Study Population	Research Question & Design	Length of follow-up	Main results	Application to the UK population and settings	Confounders/comments
Bertera 1990 US	Cohort study.	2	-	1,400 employees from a large office complex, further details are not provided.	<p>Aim: To assess the relative efficacy and cost-effectiveness of a stop smoking clinic and self help kit for smoking cessation in a work environment.</p> <p>Intervention: Employers (smokers and non-smokers) were invited to attend a stop smoking programme orientation meeting, where four 45 minute meetings were presented by a health educator and a representative of the local American Lung Associate during lunchtimes. At the end of the meetings employees were encouraged to register for either self help or a clinic cessation intervention.</p> <p>70 employees paid for the self help kit or attended a</p>	18-months.	<p>The number of cigarettes smoked per day was 26.7 at baseline and 17.9 at follow up for those in the clinic; and 28.4 at baseline and 20.3 at follow up for those in the self help group.</p> <p>The total cost of the staff time was \$300 for the self help group and \$740 for the clinic group. Total expenditures were \$44.50 and \$1,385 for the self help and clinic groups, respectively. The cost per participant was \$16.61 for the self help and \$32.21 for the clinic.</p> <p>The cost per successful quitter was \$149.50 and \$153.89 in the self help and clinic groups respectively.</p>	This study was reported in 1990 and is an American study, it therefore may not be applicable other UK.	The sample size of this study is small.

					six week clinic. The kit consisted of a quit manual, a maintenance manual, and an audio cassette on deep muscle relaxation and other stress management techniques. The clinic employed a rational progress from awareness of smoking habits to behavioural change, activities and assignments were used to show the smoker how to change their behaviour.				
Borland 1990 Australia As referenced in Moher et al. 2005	Survey.	2	+	2,113 employees were surveyed before and after the ban. Of these 391 were smokers.	Aim: Examine the impact of a smoking ban in Australian Public service. The ban was announced a year before it came into effect. Publicity, pre-deadline phasing, and smoking cessation programmes were available before the ban came into effect. Intervention: A questionnaire was sent to participants two to four weeks before the ban and five to six months after. The questionnaire asked smokers to estimate the number of cigarettes smoked on workdays and non-workdays; the number of cigarettes smoked in the last 24 hours (divided into before work, while working indoors, while working outdoors, during coffee breaks, at lunch time, the hour after work, in the rest of the evening). Questions	Six months.	Of the 2,113 people in the sample, 23.3% were smokers at the initial survey and 22.3% were smokers at follow up (a reduction of 21 people). 57 smokers at the time of initial survey had quit at follow up, 36 previous non-smokers were smoking at follow up. The mean reduction in cigarettes was 5.2 following the ban. Following the ban consumption of cigarettes was reduced for moderate smokers (by 5.8 cigarettes a day) and for heavy smokers (7.9 cigarettes per day). Smoking whilst working was reduced by 7 cigarettes per day, but smoking outside the home increased by 0.7 cigarettes per day. By extrapolating their results	Unclear.	None.

					regarding attitudes to smoking and smoking bans were also asked - this data was reported elsewhere.		to the entire Australian Public Service the authors estimated that 24.7% of the 170,000 public servants would be smokers. Using the reduction of 5.2 cigarettes per day the ban would result in a reduction of 52 million cigarettes or \$5.2 million a year in relation to tobacco sales.		
Curry 1998 US	Cohort analysis.	2	-	The study population included all adults (aged 18-64) enrolled on the Group Health Cooperative (GHC) in Washington. The standard coverage group included 26,983 adults; the reduced coverage group included 34,455 adults; flipped coverage included 10,068 adults; and the full coverage includes 18,499 adults.	Aim: To investigate the effect of insurance coverage on the demand for and the use of smoking cessation services. Intervention and control: Four types of insurance coverage were compared. Employees did not select their own coverage. All plans included NRT and a behavioral programme called Free and Clear. The four types of coverage were: 1) standard coverage - 50% co-payment for behavioural therapy and \$5 per NRT prescription; 2) reduced coverage - 50% co-payment for both the behavioural therapy and NRT; 3) flipped coverage - no co-payment for the behavioural therapy and 50% co-payment for NRT; 4) full coverage - full coverage for both behavioral therapy and NRT.	Unclear.	The results of the cost-effectiveness analysis shows that the cessation rate was 1) standard coverage - 38%; 2) reduced coverage - 31%; 3) flipped coverage - 33%; 4) full coverage - 28%. The total cost per benefit was 1) standard coverage - \$928; 2) reduced coverage - \$1,127; 3) flipped coverage - \$1,036; 4) full coverage - \$1,192. The cost per benefit to the user was 1) standard coverage - \$130; 2) reduced coverage - \$326; 3) flipped coverage - \$166; 4) full coverage - \$21. The cost per benefit to the health care plan was 1) standard coverage - \$797; 2) reduced coverage - \$801; 3) flipped coverage - \$870; 4) full coverage - \$1,171.	This study was based on insurance coverage for smoking cessation interventions and as such is unlikely to be relevant to the UK.	The amount of smoking cessation services used varies with the amount of insurance coverage.

Erfurt 1991 US As referenced in Moher et al. 2005	RCT.	1	++	Employees of four manufacturing plants.	Aim: Determine the cost-effectiveness of a work site wellness programme aimed at reducing cardiovascular disease risks of employees at three manufacturing plants. Intervention and control: Four manufacturing plants were randomly assigned to one of the following wellness programmes: 1) control site; 2) health education site - an active wellness committee used newspaper articles, health fairs, sign up tables and flyers to attract participation into weight loss and smoking cessation classes offered at least twice a year; 3) health education and follow-up counselling site - counselling included one-to-one guided self help, formal consultation classes, mini group interventions and full group classes; 4) health education, follow-up counselling and plant organisation site - in addition to the above health communication networks were created.	One-year.	The average annual cost per employee was \$2.97 for the control, \$19.68 for the health education, \$30.96 for the health education plus follow-up, and \$38.31 for the health education, follow up and plant organisation. The percentage of CVD risks reduced were 34% for the control, 35% for the health education, 44% for the health education plus follow-up, and 46% for the health education, follow up and plant organisation. The total direct cost per percentage of risks reduced and relapse prevented was less than one dollar per patient per year.	This paper was published in 1991 and is not directly related to a smoking cessation intervention, and therefore may not be applicable to the UK.	None.
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Javitz 2004 US	RCT.	1	+	Primary care physicians in Seattle referred eligible patients	Aim: Assess the return on investment from an employer's perspective of four different smoking cessation programmes. Smoking status was assessed at 12 months. Intervention and control: Participants were randomised to either (medication was given for eight weeks and counselling lasted up to one year):1) Bupropion (150 mg per day) plus less intensive counselling. 2) Bupropion (150 mg per day) plus more intensive counselling. 3) Bupropion (300 mg per day) plus less intensive counselling.4) Bupropion (300 mg per day) plus more intensive counselling. Less intensive counselling was based on the Zyban Advantage Plan (ZAP). Participants received personalised intervention material, a five to ten minute scripted call after the quit date and access to a 24-hour automated toll tree support line. More intensive counselling was based on Free and Clear (FC) phone programme. Participants received self help material plus support materials for family and friend, an in depth phone assessment and counselling, four prescheduled follow up calls and access to a toll free number.	One-year.	The 12 month cessation rates for each intervention were as follows:1) 23.6%; 2) 31.4%; 3) 25.7%; 4) 33.2%.The total costs of the intervention per employee was 1.) \$119; 2) \$195; 3) \$207; 4) \$283.Cost per additional smoker at 12 months was1) \$994; 2) \$956; 3) \$1408; 4) \$1275.The 5-year benefit to the employer per 12 month non-smoker was \$3745 for all interventions.The 5-year benefit to employer per employee was:1) \$472; 2) \$764; 3) \$550; 4) \$832.The net benefit to employer per employee was:1) \$353; 2) \$569; 3) \$343; 4) \$548.The internal rate of return per year was:1) 31.7%; 2) 31.4%; 3) 21.6%; 4) 24.1%.	This study was carried out in the US, and may not be applicable to the UK.	Employers can receive competitive returns on investment from sponsoring smoking cessation programmes. 150mg bupropion yields better returns than the higher dose. More intensive interventions should be favoured.
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Jeffery 1993 US As referenced in Moher et al. 2005	RCT.	1	+	596.8 employees in the treatment group and 645.1 in the control. The mean age was 38.1 in the treatment group and 37.9 in the control group. 55% were female in the treatment group compared to 52.9 in the control group. 24.4% were current smokers in the treatment group and 24.7% in the control group.	Aim: Report the results of a large scale randomised controlled trial - The Healthy Worker Project. Intervention: The intervention involved on-site classes and an incentive system organised through payroll deduction. There were four rounds of classes, over the 2 years, each consisting of 11 classes. The classes were held on site and in employee time. The classes were aimed at weight loss and smoking cessation and were led by professional health educators who were paid by the study. Control: 'No intervention'.	Two-years.	Over the two years 43% of smokers quit. The total cost of the smoking intervention was \$1,500 (\$30 per session in instructor time plus the cost of the materials). The authors estimate the intervention is economically justified if between 8 and 16 people quit per workplace.	This study is potentially too early to be of relevance.	None.
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McGhan 1996 US	Economic analysis.	1	+	Hypothetical cohort, further details are not provided.	<p>Aim: To compare several smoking cessation interventions in terms of the costs and benefits from an employer's perspective.</p> <p>Intervention and control: The interventions studied were (quit rates at >= 6 months were taken from the literature):</p> <ol style="list-style-type: none"> 1) Self care (quit rate of 15%, CI, 3-27); 2) Five day behavioural programme (quit rate of 26%, CI, 14-38); 3) Group withdrawal clinic (quit rate of 30%, CI, 15-45); 4) Nicotine patch and weekly group counselling (quit rate of 26%, CI, 22-31); 5) Nicotine patch and weekly individual counselling (quit rate of 20%, CI, 18-23); 6) Nicotine patch and no or minimal counselling (quit rate of 15%, CI, 11-17); 7) Nicotine patch and pharmacists consultation (quit rate of 31%); 8) Nicotine patch, pharmacists consultation, and comprehensive behavioural programme (quit rate of 44%). 	One- year.	The employer would receive the greatest net benefit from the nicotine patch with pharmacists smoking cessation consultation and patient participation in a formal smoking cessation programme (assuming the employer reimburses the employee for 100% of the treatment costs). The cost of this treatment was \$351 with a \$302 net benefit to the employer for the first year that the employee does not smoke and \$1483 for each year thereafter.	This study was carried out in the US, but the quit rates used within the model may be applicable to the UK.	None.
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Moher 2006 UK	Systematic review.	1	++	Adults over 18 years, who are in employment and who smoke.	Aim: The aim of this systematic review was to determine the extent to which workplace smoking cessation interventions stop or reduce smoking. Intervention and control: The review focussed on the following types of intervention: 1) Group interventions aimed at the individual to promote smoking cessation using either: interventions were included that did not modify the workplace as a whole but did include behavioral interventions for the individual; self-help materials; advice from a health professional and pharmacological treatments. 2) Intervention aimed at the work place as a whole, which included workplace tobacco control policies and bans; social support for not smoking; environmental support for not smoking; incentive; and comprehensive workplace programming.	-	A summary of the results is presented here. The authors concluded that there was strong evidence of the effectiveness of group therapy; individual therapy and pharmacological treatments, when compared to minimal or no intervention. Self-help material was less effective. Tobacco bans were shown to reduce cigarette consumption during the day but the authors note that their effect on overall consumption is less clear. The authors did not detect increased cessation rates from adding social and environmental support to the interventions. Competitions and incentives did increase attempts to stop smoking but there was less evidence of the actual rate of quitting.	Yes (UK study).	The authors concluded: <ul style="list-style-type: none"> • The evidence for interventions aimed at the individual was strong, but self help interventions were less effective. It does not matter whether individual interventions were offered in the workplace or elsewhere. • There was limited evidence concerning the effectiveness of competitions and incentives organised by the employer. • Smoking bans did decrease consumption during the day. • There was a lack of evidence concerning the comprehensive intervention's effect on cessation. • There was a lack of evidence surrounding the cost-effectiveness of workplace smoking cessation programmes.
Nielsen 2000 US	Cohort study.	2	++	Not provided.	Aim: To compare four interventions to reduce smoking. The analysis was undertaken from the employer's perspective. Intervention and control: The following interventions were compared: 1) Sustained release bupropion (Zyban); 2) NTP (Habitrol Nicotine Transdermal System); 3) Bupropion and NTP; 4) Placebo.	One - year	The net benefit of \$338 for bupropion per employee was attempts to quit, of \$26 for NTP; \$178 for the two combined and \$258 for placebo. The quit rate was 0.303 (0.246-0.365) for bupropion, 0.164 for NTP (0.120-0.216); 0.355 for the two combined (0.295-0.419) and 0.156 for placebo (0.104-0.222).	This was carried out in America, the analysis is undertaken from the employee's perspective and the costs may not be applicable to the UK.	The authors comment that the quit rates may overestimate the rates that would be obtained in more real life settings. Would be quitters (who attempted and failed several times before quitting) are not considered in the model.

Parrott 2000 Scotland	Telephone survey.	2	+	200 Scottish workplaces were surveyed. Workplaces were included if they employed more than 50 people.	Aim: To estimate the cost to employers of smoking in the workplace in Scotland. The aim was to highlight the potential gains from smoking cessation provision.	N/A	The annual cost of employee smoking in Scotland is in the region of £450 million as a result of lost productivity; \$40 million from higher rates of absenteeism among smokers, and £4 million as a result of fire damage.	Yes (UK study).	This study does not focus on cost-effectiveness.
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Section 7: Excluded Studies

7.1 EXCLUDED PAPERS

7.1.1 Identified from the workplace search

Paper	Reason for Exclusion
Adams EK Young TL. Costs of smoking: A focus on maternal, childhood, and other short-run costs. <i>Medical Care Research and Review</i> . 1999; 56 (1): 3-29.	This study estimated the costs attributable to smoking and did not investigate as smoking cessation intervention.
Albertsen K, Hannerz H, Borg V, Burr H. The effect of work environment and heavy smoking on the social inequalities in smoking cessation. <i>Public Health</i> . 2003; 117 (6): 383-8.	This is a Danish paper that investigates social differences with regard to smoking cessation. A smoking cessation intervention was not studied.
Cruse SM, Forster NJD, Thurgood G, Sys L. Smoking cessation in the workplace: Results of an intervention programme using nicotine patches. <i>Occupational Medicine</i> . 2001; 51 (8): 501-506.	This study did not report the costs of the intervention.
Erfurt JC, Foote A, Heirich MA. The cost-effectiveness of worksite wellness programs for hypertension control, weight loss, smoking cessation, and exercise. <i>Personnel Psychology</i> . 1992; 45 (1): 5-27.	This study focused on cardiovascular risks and was not concentrated on smoking cessation.
Halpern MT, Khan ZM, Young TL, Battista C. Economic model of sustained-release bupropion hydrochloride in health plan and work site smoking-cessation programs. <i>American Journal of Health-System Pharmacy</i> . 2000; 57 (15): 1421-1429.	This study focussed entirely on bupropion which is not the focus of our review.
Hodgson TA. Cigarette smoking and lifetime medical expenditures. <i>The Milbank Quarterly</i> . 1992; 70 (1): 81-125.	This is a description of a model undertaken in 1990, concerned with the lifetime costs of smoking. It did not provide information concerning smoking cessation interventions.
Javitz HS, Zbikowski SM, Swan GE, Jack LM. Financial burden of tobacco use: an employer's perspective. <i>Clinics in Occupational and Environmental Medicine</i> . 2005; 5 (1): 9-29.	This study investigated the financial burden of tobacco use, not a smoking cessation intervention.
Mankani SK, Garabrant DH, Homa DM. Effectiveness of nicotine patches in a workplace smoking cessation program: an eleven-month follow-up study. <i>Journal of Occupational and Environmental Medicine</i> . 1996; 38 (2): 184-189.	This study focused entirely on NRT, which is not the focus of our review.
Perreault S, Hamilton VH, Lavoie F, Grover SA. Treating hyperlipidemia for the primary prevention of coronary disease. <i>Archives of Internal Medicine</i> . 1998; 375-381.	This study was not concerned with smoking cessation interventions.
Pullon S, Cornford E, McLeod D, De SK, Simpson C. Workplace factors: The key to successful and sustained continuation of a general practice-based smoking cessation programme. <i>Australian Journal of Primary Health</i> . 2005; 11 (1): 55-62.	This study investigated training general practitioners to deliver smoking cessation and not the intervention itself.

Richmond R, Heather N, Holt P. Programmes for tobacco and alcohol users in Australian work-places. <i>Drug and Alcohol Review</i> . 1996; 385-392.	This study reported the findings of a survey concerned with the extent of programmes in Australian workplaces aimed at tobacco and alcohol use, and the degree to which the cost-effectiveness of this programmes is known.
Schauffler HH. Integrating smoking control policies into employee benefits: a survey of large California corporations. <i>American Journal of Public Health</i> . 1993; 83 (9): 1226-30.	This is a Canadian study that investigated the possibility of integrating smoking control policies into employee benefits, in terms of health insurance. This study does not have relevance for the UK.
Swank RT, Becker DM, Jackson CA. The costs of employee smoking. <i>Archives of Internal Medicine</i> . 1988; 148 445-448.	This is a description of a computer-based model aimed at estimating the costs of employee smoking. Whilst smoking cessation interventions were included they were not described in detail.

7.1.2 Identified from the mass media place searches

Brenner H Mielck A. Smoking prohibition in the workplace and smoking cessation in the Federal Republic of Germany. <i>Preventive Medicine</i> . 1992; 21 (2): 252-61.	Too dated to be of relevance.
Buck D. The cost-effectiveness of smoking cessation interventions; what do we know? <i>International Journal of Health Education Place Published: Manchester</i> . 1997; 35 (2): 44-52.	This study did not investigate an intervention.
Ong MK Glantz SA. Free nicotine replacement therapy programs vs implementing smoke-free workplaces: a cost-effectiveness comparison. <i>American Journal of Public Health</i> . 2005; 95 (6): 969-975.	This study focused entirely on NRT, which is not the focus of our review.

Section 8: Search Strategy

8.1 WORKPLACE POLICIES SEARCH STRATEGIES AND RESULTS

NHS Economic Evaluation Database (NHS EED). CRD internal database. 1994-2006/Jul. Searched 9th August 2006.

93 records were retrieved.

s smok\$ or tobacco\$ or cigarette\$ or nicotine or bidi\$ or kretek or paan or gutkha or snuff or snus or betel or hand(w)roll\$
s occupational or workplace\$ or work(w)place\$ or work or worker\$ or office or offices or factory or factories
s employee\$ or business\$
s s1 and (s2 or s3)

Health Economic Evaluation Database (HEED). CD-ROM. August 2006. Searched 9th August 2006.

97 records were retrieved.

AX=smoke or smoker or smokers or smoking or tobacco or tobaccos or cigarette or cigarettes or cigar or cigars or nicotine or bidi or bidis or beedi or beedis or kretek or paan or gutkha or snuff or snus or betel or (hand roll) or (hand rolled) or (hand rolling)
AX=occupational or workplace or workplaces or (workplace) or (workplaces) or work or worker or workers or office or offices or factory or factories
AX=employee or employees or business or businesses
CS=1 and (2 or 3)

An additional 578 records were retrieved from the results of the review searches.

References

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3. McGhan WF Smith MD. Pharmacoeconomic analysis of smoking-cessation interventions. *American Journal of Health-System Pharmacy*. 1996; **53** (1): 45-52.
4. Moher M, Hey K, Lancaster T. Workplace interventions for smoking cessation. *Cochrane database of systematic reviews (Online)*. 2005; (2): CD003440-
5. Parrott S, Godfrey C, Raw M. Costs of employee smoking in the workplace in Scotland. *Tobacco Control*. 2000; **9** (2): 187-192.
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APPENDIX A

Health Economic Appraisal Forms

To be supplied