

Healthcare financing systems for increasing the use of tobacco dependence treatment (Review)

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TABLE OF CONTENTS

ABSTRACT	1
PLAIN LANGUAGE SUMMARY	2
BACKGROUND	2
OBJECTIVES	2
CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW	2
SEARCH METHODS FOR IDENTIFICATION OF STUDIES	3
METHODS OF THE REVIEW	4
DESCRIPTION OF STUDIES	5
METHODOLOGICAL QUALITY	6
RESULTS	7
DISCUSSION	8
AUTHORS' CONCLUSIONS	10
POTENTIAL CONFLICT OF INTEREST	10
ACKNOWLEDGEMENTS	10
SOURCES OF SUPPORT	10
REFERENCES	11
TABLES	13
Characteristics of included studies	13
Characteristics of excluded studies	15
ADDITIONAL TABLES	16
Table 01. Quality assessment	16
Table 02. Quality assessment of economic evaluations	18
ANALYSES	19
Comparison 01. self-reported abstinence from smoking at at least 6 months	19
Comparison 02. quit attempt for at least 24 h	19
Comparison 03. utilization of tobacco dependence treatment	19
Comparison 04. financial interventions directed at healthcare providers	19
INDEX TERMS	19
COVER SHEET	20
GRAPHS AND OTHER TABLES	21
Analysis 01.01. Comparison 01 self-reported abstinence from smoking at at least 6 months, Outcome 01 full versus no financial coverage	21
Analysis 01.02. Comparison 01 self-reported abstinence from smoking at at least 6 months, Outcome 02 full versus partial financial coverage (point prevalence)	22
Analysis 01.03. Comparison 01 self-reported abstinence from smoking at at least 6 months, Outcome 03 partial versus no financial coverage (point prevalence)	22
Analysis 02.01. Comparison 02 quit attempt for at least 24 h, Outcome 01 full versus no financial coverage	23
Analysis 02.02. Comparison 02 quit attempt for at least 24 h, Outcome 02 full versus partial financial coverage	23
Analysis 02.03. Comparison 02 quit attempt for at least 24 h, Outcome 03 partial versus no financial coverage	23
Analysis 03.01. Comparison 03 utilization of tobacco dependence treatment, Outcome 01 full versus no financial coverage	24
Analysis 03.02. Comparison 03 utilization of tobacco dependence treatment, Outcome 02 full versus partial financial coverage	25
Analysis 03.03. Comparison 03 utilization of tobacco dependence treatment, Outcome 03 partial versus no financial coverage	25
Analysis 04.01. Comparison 04 financial interventions directed at healthcare providers, Outcome 01 self-reported point prevalence abstinence	26
Analysis 04.02. Comparison 04 financial interventions directed at healthcare providers, Outcome 02 use of nicotine replacement therapy and/or bupropion	26
Analysis 04.03. Comparison 04 financial interventions directed at healthcare providers, Outcome 03 behavioural interventions	26

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ABSTRACT

Background

Smoking cessation treatment increases the number of successful quitters compared with unaided attempts to quit. However, only a small proportion of people who smoke take up treatment. One way to increase the use of smoking cessation treatment might be to give financial support through healthcare systems.

Objectives

The primary objective of this review was to assess the effect of using healthcare financing interventions to reduce the costs of providing or using smoking cessation treatment on abstinence from smoking.

Search strategy

Eligible studies were identified by a search of the Cochrane Tobacco Addiction group specialized register, the Cochrane Central Register of Controlled Trials (CENTRAL) Issue 3, 2003, MEDLINE (from January 1966 to August 2003) and EMBASE (from January 1980 to October 2003), screening references of relevant reviews and studies, and contacting experts in the field.

Selection criteria

We included randomized controlled trials (RCTs), controlled trials (CTs) and interrupted time series (ITS) in which the study population consisted of smokers or healthcare providers or both.

Data collection and analysis

Two reviewers independently extracted data and assessed the quality of the included studies. We calculated odds ratios (ORs) and risk differences (RDs) for the individual studies and performed meta-analysis using a random-effects model. We included economic evaluations when a study presented the costs and effects of two or more alternatives.

Main results

Four RCTs and two CTs were directed at smokers. Five studies compared the effect of a full benefit with no benefit of which four reported the prolonged self-reported abstinence rate and showed an increase of 2% (95% confidence interval [CI] 0.00 to 0.05). The pooled OR for achieving abstinence for a period of six months was 1.48 (95% 1.17 to 1.88). Two studies directed at smokers compared a full benefit with a partial benefit and showed that the odds of being abstinent were 2.49 times higher with a full benefit (95% CI 1.59 to 3.90). The pooled RD showed a non-significant increase (RD 0.05; 95% CI -0.07 to 0.16). Only one study compared a partial benefit with no benefit and only one study was directed at healthcare providers. When a full benefit was compared with a partial or no benefit, the costs per quitter varied between \$260 and \$2330.

Authors' conclusions

There is some evidence that healthcare financing systems directed at smokers which offer a full financial benefit can increase the self-reported prolonged abstinence rates at relatively low costs when compared with a partial or no benefit. Since there were some limitations to the methodological quality of the studies the results should be interpreted with caution. More studies are needed on the effects of healthcare financing systems directed at healthcare providers.

PLAIN LANGUAGE SUMMARY

Interventions that reduce the cost to smokers of using smoking cessation treatment can increase quit rates.

Increasing the level of health insurance coverage or reducing direct costs of smoking cessation treatment may increase the number of smokers who quit successfully, as well as the number of quit attempts and the use of treatment. There are methodological problems with the included studies so the results need to be interpreted cautiously. There is not enough evidence to show whether offering financial incentives to healthcare providers for identifying and treating smokers is effective in increasing the number of smokers who quit.

BACKGROUND

A number of interventions, including counselling and pharmacotherapy, can help individuals to quit smoking. Although the absolute number of people who make a successful quit attempt is low, quit rates are higher with the use of smoking cessation treatment than without (Hughes 2004; Silagy 2004; Stead 2005; West 2000). Without the use of smoking cessation treatment, only about 3% remain abstinent after one year (West 2000). Despite this evidence, the use of smoking cessation treatment is still limited (Zhu 2000). Costs are a significant barrier to the use of smoking cessation treatment. Healthcare providers may be deterred from offering treatment if they do not receive reimbursement, and patients may be deterred if they must pay for treatment costs. We hypothesized that provision of financial support to providers or patients or both would increase the use of smoking cessation treatment with a corresponding increase in the number of smokers undertaking a successful quit attempt (Hughes 2004; Silagy 2004; Stead 2005; West 2000).

In this economically-minded time, determining the effectiveness of an intervention is no longer enough to justify its use (Cheung 1997). As healthcare costs increase and resources are limited, it is important to determine whether financial support for smoking cessation treatment is cost-effective. In general, smoking cessation treatments are highly cost-effective when compared with other common preventive healthcare treatments like treating mild to moderate hypertension and lowering cholesterol levels (Cheung 1997; Parrot 2004). However, no previous review has evaluated the cost effectiveness of healthcare financing systems for increasing the use of smoking cessation treatment. We hypothesized that like other smoking cessation interventions healthcare financing interventions would also be cost-effective.

OBJECTIVES

The primary objective of this review was to assess the effect of reducing the costs of providing or using smoking cessation treatment by healthcare financing interventions on abstinence from smoking. As a secondary objective, we examined the effects of different levels of financial benefits on the use and/or prescription of smoking cessation treatment and on the number of smokers trying

to quit. We also aimed to assess the cost effectiveness of different interventions. We examined the costs per additional quitter, per life year gained or per quality-adjusted life year gained.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

We included randomized controlled trials (RCTs), controlled trials (CTs) and interrupted time series (ITS).

Types of participants

We included those studies in which the study population consisted of smokers or healthcare providers. The primary and secondary objectives were assessed from either a smoker's or a healthcare provider's perspective. For smokers, the aim of the healthcare financing interventions had to be to encourage the use of smoking cessation treatment. When the intervention was directed towards healthcare providers then the intervention had to affect the prescribing of smoking cessation treatment or the smoking behaviour of the patients by offering assistance to quit smoking.

Types of intervention

We included trials that studied the effects of healthcare financing interventions directed at patients or providers for increasing the use of smoking cessation treatment (e.g. delivered by government or healthcare insurance plans).

We classified financial interventions directed at patients as:

- Health insurance coverage - changes to the level of benefit available for smoking cessation treatments, including changes to co-payment or out-of-pocket payments made by patients receiving treatment.
- Direct coverage - changes to the direct cost to the smoker of using smoking cessation treatment, for example by provision of a prescription for free pharmacotherapy.
- Health insurance cost - changes to the premiums or user fees paid for health insurance.

Healthcare financing interventions directed at healthcare providers were defined as:

- Salary - payment for a set number of working hours or sessions per time unit.
- Capitation - a set amount of payment per patient for providing specific care.
- Fee-for-service - payment for every item of service or unit of care provided.
- Target payment - payment only made in respect of achieving an agreed target.
- Fund holding and organization level payment systems - which can improve the working conditions within an organization and can indirectly influence the salary of a healthcare provider.

We differentiated between healthcare financing interventions for patients and for healthcare providers, and between different levels of financial coverage. In patients, for example, comparisons can be made between full insurance coverage and co-payment. For healthcare providers, a maximum target payment can be compared with no target payment. There were no restrictions on the type of smoking cessation treatment for which the financial benefit could be offered. This could include pharmacotherapy, e.g. nicotine replacement therapy and bupropion, or behavioural counselling, or both. When the financial intervention of a study was aimed at more than one type of smoking cessation treatment, the effect of the financial intervention could be spread out over the different types of products. Studies of financial interventions that are aimed at more than one type of smoking cessation treatment therefore cannot formally be compared with studies that offer coverage for only one product. As a smoker could use more than one type of product, summing the use of the different types of smoking cessation treatment could overestimate the number of smokers who used smoking cessation treatment. For clarity, and if the data allowed, we summarized the effects for each type of smoking cessation treatment.

Types of outcome measures

We included studies when at least one of the following outcome measures was used to describe the effects of the intervention. The primary outcome measure of this review is:

- Abstinence from smoking. We included studies reporting abstinence from smoking at least six months after the start of the intervention, and we used the longest available follow up as the preferred outcome measure (Hughes 2003; SRNT 2002). Biochemically validated abstinence was preferred to self reported abstinence, and continuous or prolonged abstinence was preferred to point prevalence abstinence.

The secondary outcome measures are:

- Number of participants making a quit attempt, defined as the number of participants who attempted to quit at least once. A quit attempt is defined as not having smoked for at least 24 hours.

- Use of smoking cessation treatment, defined as the number of participants who reported having used smoking cessation treatment or who were registered by healthcare providers or medical insurance organizations as having used smoking cessation treatment.

ECONOMIC EVALUATION

To evaluate the cost effectiveness of financial interventions for smoking cessation treatment, we considered data from studies that examined both cost and effects and compared two or more alternatives.

The primary outcome measure of the economic evaluation is smoking-related:

- Costs per additional quitter.

The secondary outcome measures are:

- Costs per life year saved (LYS). This measure of health outcome incorporates the effect of an intervention on the length of life,
- Costs per quality-adjusted life year saved (QALY). This measure of health outcome incorporates the effect of an intervention on both length of life and the quality of life.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: methods used in reviews.

There was no limitation on language. Eligible studies were identified by:

- A computer-aided search of the Cochrane Tobacco Addiction group Specialised Register, the Cochrane Central Register of Controlled trials (CENTRAL), Issue 3, 2003, MEDLINE (from January 1966 to August 2003) and EMBASE (from January 1980 to October 2003). This search was performed by the trials search co-ordinator of the Tobacco Addiction review group. The following search terms, MeSH subheadings and free text words from the Effective Practice and Organisation of Care review group and the Tobacco Addiction review group were used (* indicates wild card symbol):
- design-related terms: randomized controlled trial, controlled clinical trial, random*, research design, experiment, intervention studies, comparative studies, evaluation studies, time adj series
- smoking-related terms: tobacco*, nicotine*, smok*, smoking, smoking-cessation, quit*, stop*, abstin*, abstain*, cessat*, ceas*, control*
- topic-related terms: coverage*, reimburse*, target*, payment*, remunerat*, incentive*, financ*, salar*, fee*, deductibles*, coinsurance*, co-payment*, capita*, cost next shar, prospective payment*, fund hold, prepay, prepaid, health care costs,

health insurance, health care organization, health maintenance organization or health care system.

- Screening references of relevant reviews and identified studies.
- In order to retrieve unpublished studies, experts in the field were contacted via a standardized e-mail. Unpublished studies or abstracts were included only when sufficient data were available.

METHODS OF THE REVIEW

Study selection

Based on title, keywords and abstract, one reviewer (JK) selected studies by applying the inclusion criteria to the studies identified by the literature search. When there was any doubt whether to select a study or not, a second reviewer (EJW) was consulted. Two reviewers (JK and EJW) assessed the full paper versions of the selected studies. Disagreements about inclusion were resolved by consensus, and a third reviewer (CPS) could be consulted if disagreements persisted.

Quality assessment

The articles were not blinded for authors, institution or journal title. The methodological quality of the included studies was assessed by using the Delphi List (Verhagen 1998), which also contains all items of the list developed by Jadad (Jadad 1996). The Delphi List contains nine items: method of randomization performed, allocation concealed, comparability at baseline regarding the most important prognostic indicators (e.g. gender, age, education level, tobacco consumption at baseline, number of quit attempts in the past and the use of smoking cessation treatment in the past), specification of eligibility criteria, blinding of outcome assessor, blinding of care provider, blinding of the patient, presentation of point estimates, measures of variability for the primary outcome measures presented and an intention-to-treat analysis performed. In addition to the Delphi List, we considered another six items to be important: evaluation of the success of the blinding of the outcome assessor, of the care provider and of the patient, comparability of co-interventions, specification of the primary outcome measures and a follow-up rate of over 80% (Table 01). Two reviewers (JK and EJW) independently assigned a score for each of the 15 criteria. The items were scored as 'yes' (one point), 'unclear' or 'no' (both no points). A total score for each included study was calculated by summing the number of positive criteria (range 0 to 15). High scores indicate a lower likelihood of bias. In a consensus meeting, disagreements between the two reviewers were discussed and resolved. If a study did not contain sufficient information on methodological criteria or the information was unclear, the authors were contacted for additional information.

The quality of the economic evaluations was assessed using the Consensus Health Economic Criteria (CHEC) list (Donaldson

2002). As with the development of the Delphi list, the CHEC list is based on expert consensus. The CHEC list consists of 19 items, which are described in Table 02 and incorporate the following aspects: clearly described study population (age, gender and educational level), a description of the intervention and the alternatives, a well-defined research question, an economic study design in which the costs and effects of two or more interventions are compared, a time horizon and perspective of the evaluation, the identification of relevant costs and consequences for each alternative, the measurement of costs and consequences, appropriately valued cost and consequences, the performance of an incremental analysis, the performance of discounting and sensitivity analysis, the conclusions following from the data reported, the generalizability of results, statement of conflict of interest and appropriate discussion of ethical and distributional issues. The quality of the economic evaluations was assessed by two reviewers (JK and JLS). Items scored as 'yes' received one point. Items scored as 'unclear' or 'no' received no points. A total score was calculated by summing the score of the 19 items (range 0 to 19).

Data extraction

Two reviewers (JK and EJW) extracted data from the included studies. Any discrepancies between the two reviewers were resolved by discussion. We extracted the following data:

- Methods: setting (location of care, country, year of study) and study design.
- Participants and/or healthcare providers: method of recruitment, inclusion criteria, characteristics of study population (smoking status, age, gender and motivation to quit smoking).
- Interventions: description of the intervention for each group.
- Outcome measures: definition for each study of continuous abstinence or point prevalence abstinence, number of participants making a quit attempt, prescription and use of tobacco dependence treatment.
- Results.

Two reviewers (JK and JLS) extracted data concerning the economic evaluation. Any discrepancies were resolved by discussion. We extracted the following data:

- Perspective and time horizon of the economic evaluation.
- Direct costs: volume and value of costs of the use of smoking cessation treatment, costs of consultations with healthcare providers and overhead costs (no research costs).
- Indirect costs: volume and value of general medical care, lost productivity, time and travel costs spent by participants visiting healthcare providers.
- Discounting and sensitivity analyses.

- Results of the economic evaluations.

Data analyses

We used Review Manager 4.2 to estimate the odds ratio (OR), risk difference (RD) and the corresponding 95% confidence interval (95% CI). Only intention-to-treat analyses were used. If no intention-to-treat analysis was presented than the published data were recalculated on an intention-to-treat basis, i.e. counting all drop-outs and participants lost to follow up as continuing smokers with no quit attempt and not having used smoking cessation treatment. We pooled data when at least two trials assessed the effects of healthcare financing interventions and reported data on the same outcome measure. A formal test for statistical heterogeneity, the natural approximate chi squared test, assessed whether the observed variability in effect sizes is greater than would be expected to occur by chance.

The transferability of cost estimates of different economic evaluations is mostly restricted by differences in setting. These differences can be related to patient characteristics, incidence of smoking-related diseases, availability of health resources, variations in clinical practice, incentives to healthcare providers and relative prices or costs (Drummond 1997). Pooling of the different economic evaluations is only permissible when there is no interaction between the setting and the effect of the intervention on medical consumption (Drummond 1997). When pooling is allowed, the volumes of medical consumption, like the use of smoking cessation treatment, are pooled and multiplied with the pooled costs per unit consumption. The total costs were calculated in US dollars (US\$). When the cost estimates of the different economic evaluations were not transferable, we presented cost data of the individual studies. When no incremental ratios were presented, we calculated the incremental cost effectiveness ratios ourselves. First, we calculated the total costs per group. We then divided the difference in costs between the groups by the difference in number of quitters between the groups. The calculation was checked by the authors of the studies involved.

DESCRIPTION OF STUDIES

Study selection

Using the search strategy described above, we identified 2237 references. Twenty-two studies were selected based on title, keywords and abstract. Three additional studies were found through experts in the field (Hays 1999; Pardell 2003; Shaw 2003). One other study was conducted by the reviewers themselves and is submitted for publication (Kaper 2003). We assessed the full reports of all 26 studies for eligibility. Nineteen studies were excluded (Amundson 2003; Coleman 2001; Cox 1990; Curry 1991; Doescher 2002; Donatelle 2000; Fiore 2000; Hays 1999; Hovell 1996; Latts 2002; Lave 1996; Oswald 1988; Pardell 2003; Parnes 2002; Ringen 2002; Russos 1999; Shaw 2003; Solberg 2002; Stone 2002) and seven studies were included (Boyle 2002; Curry 1998; Dey 1999;

Hughes 1991; Kaper 2003; Roski 2003; Schaffler 2001). The table 'Characteristics of excluded studies' summarizes the reasons for exclusion. Most studies were not (randomized) controlled trials or interrupted time series (Amundson 2003, Coleman 2001; Cox 1990; Doescher 2002; Fiore 2000; Latts 2002; Oswald 1988; Parnes 2002; Ringen 2002; Solberg 2002; Stone 2002). Oswald 1988 and Cox 1990 retrospectively compared the outcomes of using free and purchased gum in a non-randomized trial. Parnes 2002, Russos 1999 and Stone 2002 all used a cross-sectional design. Amundson 2003, Coleman 2001, Doescher 2002, Fiore 2000, Latts 2002, Ringen 2002 and Solberg 2002 did not have a control group and also did not use an interrupted time series design. There were other reasons for exclusion as well as study design. Lave 1996 compared two different financial systems in two different settings, and did not report data on the smoking status of the control group. The financial intervention in five studies (Curry 1991; Donatelle 2000; Hovell 1996; Pardell 2003; Russos 1999) was not directly related to the use of smoking cessation treatment. Hays 1999 was excluded, since it did not explicitly assess the effects of a financial intervention. Shaw 2003 assessed the effect of nicotine gum prices on the use of gum and abstinence rates, and has not yet reported the number of participants using smoking cessation treatment or the quit rate. Full details of the included studies are given in the relevant Table, and we describe the main features below.

Setting and design

Five of the included studies were performed in the USA (Boyle 2002; Curry 1998; Hughes 1991; Roski 2003; Schaffler 2001). One study was performed in the UK (Dey 1999) and one in the Netherlands (Kaper 2003). Four studies were conducted in cooperation with health insurance organizations (Boyle 2002; Curry 1998; Kaper 2003; Schaffler 2001). Two studies were conducted in family practices (Hughes 1991; Dey 1999) and one study was conducted in 40 clinics of a multi-specialty medical group practice (Roski 2003). Of the seven included studies, five randomly assigned the participants to the treatment group and one or two control groups (Dey 1999; Hughes 1991; Kaper 2003; Roski 2003; Schaffler 2001). The two other studies were controlled trials with respectively two and four different benefit groups (Boyle 2002; Curry 1998). None of the included studies used an interrupted time series design.

Participants

Six studies were directed at patients (Boyle 2002; Curry 1998; Dey 1999; Hughes 1991; Kaper 2003; Schaffler 2001). The study population of the included studies varied from 106 participants in Hughes 1991 to 16,922 smokers in Curry 1998. All patients were at least 18 years old. The mean age of the participants in the included studies varied from 38 to 46 years. Three studies included a general population of smokers (Curry 1998; Kaper 2003; Schaffler 2001). One study included only smokers who were motivated to quit (Dey 1999). Half of the sample included in Boyle 2002 were interested in quitting smoking. Participants in Hughes 1991

did not have to be motivated to quit to participate in the study, but were allowed to withdraw from the study after they were told that they would be randomly assigned to different price groups. Only one study assessed the effects of financial interventions directed at healthcare providers (Roski 2003). Patient behaviour was measured using a baseline and a follow-up survey after six months, including 2799 smokers aged over 18 years.

Interventions

Patient directed

Four studies investigated the effect of changes to the level of insurance coverage for smoking cessation treatment (Boyle 2002; Curry 1998; Kaper 2003; Schauffler 2001). Two studies investigated the effect of changes to the direct cost to the smoker of receiving treatment (Dey 1999; Hughes 1991). Coverage was offered for three different types of smoking cessation treatment; nicotine replacement therapy (NRT), bupropion and behavioural interventions. Three studies covered two types of smoking cessation treatment. Boyle 2002 offered coverage for NRT (patches and gum) and bupropion; Curry 1998 and Schauffler 2001 covered NRT (patches and gum) and participation in a behavioural programme. Kaper 2003 covered three types of therapy: NRT (patches, gum, sublingual tablets and lozenges), bupropion and behavioural interventions. The two studies that modified the direct cost to users of pharmacotherapy both offered NRT; Hughes 1991 offered nicotine gum at different costs and Dey 1999 offered free prescriptions for nicotine patches. The treatment periods ranged from 12 weeks (Dey 1999) to six months (Hughes 1991; Kaper 2003) and one year (Boyle 2002; Curry 1998; Schauffler 2001). The included studies also varied in the extent of insurance coverage or treatment cost and the comparisons made. Five studies compared full coverage of the cost of treatment with no coverage (Boyle 2002; Dey 1999; Hughes 1991; Kaper 2003; Schauffler 2001). One study compared full coverage of both behavioural treatment and NRT with a partial benefit requiring a 50% co-payment for either behavioural or NRT components (Curry 1998), and one study investigated the differences between a cost to the patient of US\$20, US\$6 or US\$0 per box of nicotine gum (Hughes 1991).

Health care provider directed

Roski 2003 distributed printed versions of smoking cessation guidelines to clinics in both the intervention and control group. The intervention group clinics were eligible for payments for reaching targets for registration of patients' smoking status and providing advice to quit.

Outcomes

Abstinence from smoking after six months or more from the start of the intervention was the primary and preferred outcome. In Dey 1999 abstinence from smoking was assessed at 14 weeks after the start of the reimbursement period. We therefore excluded this study with regard to the effects of reimbursement on the number of smokers. Boyle 2002 and Kaper 2003 presented self-reported continuous (more than six months) abstinence rates. Three studies

presented self-reported point prevalence abstinence data (Curry 1998; Hughes 1991; Schauffler 2001). In Hughes 1991 observers were asked to verify their smoking status

One of the secondary outcomes was the number of participants who made a quit attempt and four studies presented data on this outcome (Boyle 2002; Hughes 1991; Kaper 2003; Schauffler 2001). The other secondary outcome measure was the self-reported use or registered use of smoking cessation treatment. This was self-reported in Boyle 2002 and Kaper 2003, and registered by a health insurance organization in Curry 1998 and Schauffler 2001, and by the local pharmacy in Hughes 1991 and Dey 1999. The outcomes used in Roski 2003 were the percentage of smokers who reported being abstinent for at least the previous seven days, who used bupropion or NRT and who used any counselling services.

Three of the seven included studies presented data on the costs of the intervention, and compared the costs and effects of the intervention with one or two alternatives (Curry 1998; Hughes 1991; Schauffler 2001). All three studies used a time horizon equal to the duration of the intervention, and all used a third party payer perspective in which only the direct costs of the intervention were presented. Curry 1998 also presented a users' perspective. The cost effectiveness ratio was presented in terms of costs per user who quit smoking or costs per subject enrolled. No study presented data in terms of quality-adjusted life years saved.

METHODOLOGICAL QUALITY

Table 01 shows the results of the methodological quality assessment. The scores of the seven included studies varied between 5 and 9. Four studies randomly assigned the participants to the different benefit groups (Dey 1999; Hughes 1991; Kaper 2003; Schauffler 2001). One study randomly allocated clinics to study conditions (Roski 2003). The allocation was concealed in two studies (Dey 1999; Hughes 1991) (rated A in the Included studies table), and was unclear in Schauffler 2001 and Roski 2003 (rated B in the Included studies table). Two studies were controlled trials (Boyle 2002; Curry 1998). Only Kaper 2003 and Schauffler 2001 blinded the participants in the control group to the treatment available to the experimental group, with Kaper 2003 also evaluating the success of the blinding. In the study of Roski 2003, all participants were blinded. Only Curry 1998 blinded the healthcare provider. The outcome assessor was blinded in three of the seven studies (Boyle 2002; Curry 1998; Hughes 1991). The follow-up rate was less than 80% for all the included studies. Four studies did not include an intention-to-treat analysis (Boyle 2002; Dey 1999; Roski 2003; Schauffler 2001).

The number of studies in each comparison is small and we have not presented the results of the meta-analysis by quality score. However, subgroup analyses were performed excluding the study

with the lowest score (Boyle 2002) to examine whether the meta-analysis results were sensitive to its inclusion.

The methodological quality assessment regarding the economic evaluations is presented in Table 02. The score of the three studies varied between 8 and 10 (Curry 1998; Hughes 1991; Schaffler 2001). In none of these studies were all relevant costs identified, and the identified costs were not measured and valued appropriately. For example, costs of visits to healthcare providers were not measured, no contact times were presented, the volumes of the use of smoking cessation treatment were incomplete and the sources of cost valuation were not described. The preferred effect outcome, e.g. biochemically validated abstinence, was not measured. Incremental analyses and sensitivity analyses were not performed. Direct costs were not discounted, but this was appropriate as the time frame of the cost analysis was less than 12 months. No statements of potential conflicts of interest were presented.

RESULTS

To determine the general effect of healthcare financing interventions, we performed meta-analysis using a random-effects model. When only one study examined the effects of an intervention on a specific outcome, we presented the results of this individual study graphically.

The effect of financial interventions directed at smokers on abstinence from smoking

Four studies assessed the effects of a full benefit compared with no benefit on the number of smokers who quit. Two studies presented the self-reported continuous abstinence rate at 12 months (Boyle 2002; Kaper 2003), and two studies presented the self-reported point prevalence abstinence rate at six months (Hughes 1991; Schaffler 2001). In all four studies, the abstinence rate in the treatment group was higher than in the control group. Pooling the data of the four studies resulted in an odds ratio (OR) of 1.48 (95% confidence interval (CI) 1.17 to 1.88) and a risk difference (RD) of 0.02 (95% CI 0.00 to 0.05). Excluding Boyle 2002 did not change the significance of either outcome.

Two studies compared a full benefit with a partial benefit (Hughes 1991; Curry 1998). In both studies, more participants quit smoking at six months in the full benefit group. The pooled OR for the self-reported point prevalence abstinence was significantly higher for the full benefit group compared with the partial benefit group (OR 2.49; 95% CI 1.59 to 3.90). The pooled RD did not show a significant effect (RD 0.05; 95% CI -0.07 to 0.16).

There was no statistically significant difference in self-reported abstinence in the one study (Hughes 1991) that compared nicotine gum at a reduced price to gum at usual price (OR 0.69; 95% CI 0.11 to 4.37; RD -0.02; 95% CI -0.14 to 0.09).

The effect of financial interventions directed at smokers on the number of participants making a quit attempt

Four studies assessed the effects of a full benefit compared with no benefit on the number of participants who tried to quit (Boyle 2002; Hughes 1991; Kaper 2003; Schaffler 2001). In all four studies more smokers in the intervention group tried to quit smoking compared with smokers in the control group. The pooled OR was 1.32 (95% CI 1.18 to 1.49) and the pooled RD was 0.05 (95% CI 0.03 to 0.08). The exclusion of Boyle 2002 did not change the significance of the OR, but the risk difference was no longer significant due to an increased confidence interval (RD 0.06, 95% CI 0.00 to 0.11).

Only Hughes 1991 collected data on the number of participants who attempted to quit smoking with a partial incentive. No significant differences were observed in number of participants making a quit attempt between a full and partial incentive (OR 1.54; 95% CI 0.45 to 5.31; RD 0.07; 95% CI -0.12 to 0.25). There were also no significant differences between a partial and no incentive (OR 1.82; 95% CI 0.65 to 5.11; RD 0.12; 95% CI -0.08 to 0.32).

The effect of financial interventions directed at smokers on the use of smoking cessation treatment

Five studies (Boyle 2002; Dey 1999; Hughes 1991; Kaper 2003; Schaffler 2001) assessed the effects of covering the cost of using NRT. All five studies showed an increased use of NRT. The pooled OR was 2.92 (95% CI 1.49 to 5.71) and the pooled RD was 0.12 (95% CI 0.05 to 0.19). Excluding Boyle 2002 did not change the significance of the OR or the RD. Of both OR and RD, the point estimator and the confidence interval increased.

Two studies (Boyle 2002; Kaper 2003) assessed the effects of covering the cost of using bupropion. The pooled OR for the use of bupropion was not statistically significant (OR 2.47; 95% CI 0.86 to 7.13). The pooled RD was significantly higher for full coverage when compared with no coverage (RD 0.04; 95% CI 0.02 to 0.06).

Two studies (Kaper 2003; Schaffler 2001) recorded the number of smokers who participated in a behavioural programme. The pooled OR and RD were not significantly higher when the cost of the programme was covered (OR 2.56; 95% CI 0.66 to 9.94; RD 0.02; 95% CI -0.02 to 0.06).

When the effect on the use of NRT with a full benefit was compared with a partial benefit, the two studies (Curry 1998; Hughes 1991) showed an increased use in favour of the full benefit. The pooled OR was statistically significant (OR 2.96; 95% CI 2.15 to 4.09), while the pooled RD was not significant (RD 0.06; 95% CI -0.01 to 0.13). Only Curry 1998 assessed the effect of full coverage compared with partial coverage for behavioural interventions. Full coverage increased the number of participants in a behavioural intervention by 8% (OR 3.67; 95% CI 3.06 to 4.39; RD 0.08; 95% CI 0.07 to 0.09).

There was no statistically significant difference in the use of NRT in the one study (Hughes 1991) that compared nicotine gum at a reduced price to gum at usual price (OR 1.56; 95% CI 0.62 to 3.90; RD 0.11, 95% CI -0.12 to 0.34).

The effect of financial interventions directed at healthcare providers

Roski 2003 assessed the impact of financial incentives directed at healthcare providers on the self-reported point prevalence abstinence rate and the use of smoking cessation treatment reported by the patients. We used the per protocol data to calculate the ORs and RDs for the comparisons, which does not allow for clustering of patients within clinics. Since the uncorrected confidence intervals do not indicate a significant effect, the conclusions are not affected. When healthcare providers were offered target payment, 22.4% patients were abstinent compared with 19.2% patients in the control group. The OR was not statistically significant. The RD was 0.03 (95% CI 0.00 to 0.07). The use of NRT or bupropion was lower amongst patients in the intervention group (19.8%) than in patients in the control group (21.6%). In the intervention group, 1.3% patients reported having used counselling services compared with 1.0% patients in the control group. The OR and RD were not statistically significant.

The cost effectiveness of financial interventions

Three studies presented data on the costs of the intervention (Curry 1998; Hughes 1991; Schauffler 2001). All three studies were directed at smokers. As pooling of the different economic evaluations is only allowed when there is no interaction between the setting and the effect of the intervention (Drummond 1997), we have not pooled the results of the individual studies. None of the studies calculated the costs per quality-adjusted life year saved. Only smoking-related outcomes were presented and the incremental analyses were performed by the reviewers.

Curry 1998 presented the direct costs of NRT and a behavioural intervention programme for the different coverage groups. Indirect costs were not registered. With full coverage, the average costs per benefit user who quit were US\$21 for users and US\$1117 for the health plan. With partial coverage, the costs per benefit user who quit were respectively US\$326 and US\$801. We also calculated the incremental cost effectiveness ratio: when full coverage is introduced instead of partial coverage, the financial gain for users would be US\$5316 for each benefit user who quit. For the health plan, the costs would be US\$7646 per benefit user who quit.

Hughes 1991 included the following direct costs: nicotine gum, a smoking cessation booklet and healthcare provider's time. Participant's time was regarded as an indirect cost. The calculated financial gain per participant enrolled was US\$1120 with full coverage when gum was provided free, US\$280 when gum was provided at a cost of \$6/box and US\$413 when gum cost £20. For the incremental analyses, we calculated the costs per additional quitter for the different comparisons. When a full incentive was compared with a partial incentive, the costs per additional quitter were US\$260. When a full incentive was compared with no incentive, the costs were US\$716. A partial incentive was not cost effective when compared with no incentive.

Schauffler 2001 reported the total costs of NRT, the behavioural programme and the self-help kit for the treatment group, but no

control group costs. The authors have subsequently advised us that the control group costs amounted to US\$29 per participant, for the self-help kit. The average costs per quitter were US\$1495. The costs per additional quitter for full coverage compared with no coverage were US\$1247.

DISCUSSION

The objectives of this review were to assess the effect of healthcare financing interventions for increasing the use of smoking cessation treatment on the abstinence rate, on the number of participants that attempted to quit and on the use of smoking cessation treatments, and where possible to assess cost effectiveness. Our extensive literature search resulted in the inclusion of five randomized trials and two controlled trials.

Six studies were directed at smokers. Four studies, directed at smokers, compared a full financial benefit with no benefit, and suggested that the smokers in the full benefit group had a 1.5 times higher chance of achieving self-reported abstinence. The chance of making a quit attempt was 1.3 times higher in the full benefit group than in the no benefit group. The use of nicotine replacement therapy (NRT) and bupropion was respectively 2.9 and 2.5 times higher for full benefit smokers than for no benefit smokers. The number of smokers who participated in a behavioural programme was not significantly higher with a full benefit compared with no benefit.

One study assessed the effects of a financial incentive for healthcare providers who reached targets for identifying smokers and documenting the provision of advice to quit (Roski 2003). No significant effect was found on self-reported abstinence amongst smokers treated after the introduction of the scheme, and there was also no evidence that clinical practice patterns had changed more in the incentive group clinics than in the controls.

Three studies presented data on the costs of the financial benefit. When a full benefit was compared with a partial or no benefit, the costs per quitter varied between US\$260 and US\$2330. A financial benefit was not cost effective in the one study that compared a partial incentive with no incentive.

From the results of this review, we conclude that when directed at smokers a full benefit can increase the self-reported abstinence rate and the use of smoking cessation treatment compared with a partial or no financial benefit. Although the absolute differences were small, the costs per additional quitter were low. The number of participants making a quit attempt seems to increase only with a full benefit rather than no benefit. When directed to healthcare providers, one study showed that a financial benefit was not effective in increasing the percentage of smokers who were offered assistance to quit.

This is the only review to assess the effects of financial interventions aimed at encouraging the prescription and use of smoking

cessation treatments. We found two reviews (Bains 1998; Moher 2005) examining the effects of financial interventions, but they included studies which offered a financial benefit for abstinence rather than the use of provision of smoking cessation treatment. Bains 1998 discussed the use and impact of incentives in population-based smoking cessation programmes. Smokers participated in contests and lotteries or received financial incentives. Moher 2005 addressed the effectiveness of workplace interventions for smoking cessation.

The results of this review should be interpreted in the light of the issues discussed below, i.e. the comparability and the methodological quality of the included studies.

Comparability

This review shows that the included studies were heterogeneous with respect to the study setting, motivation to participate in the study, motivation to quit smoking and the intervention used. Because of this heterogeneity, the results of the meta-analysis have to be interpreted with care. The setting of the included studies ranged from family practices in the UK and USA to health insurance organizations in the USA and the Netherlands. As each country has a different healthcare system, comparisons between studies in various settings should be made in the knowledge of these differences. The included studies also differed with respect to the motivation of smokers to participate or to quit smoking. In Dey 1999, for example, participants had to be motivated to quit in order to participate. On entry into the study, motivated participants received free prescriptions for nicotine patches, and as a result, 97% of the participants in the full incentive group used at least one prescription. Omitting the Dey study reduced the statistical heterogeneity of the NRT meta-analysis, and changed the pooled odds ratio (OR) from 5.03 (95% CI 1.52 to 16.62) to 2.96 (95% CI 2.15 to 4.09), and the pooled risk difference (RD) from 0.23 (95% CI -0.09 to 0.55) to 0.06 (95% CI -0.01 to 0.13). On the other hand, Kaper 2003 and Schaffler 2001 offered coverage in a general population. As participants were not obliged to quit smoking, the use of NRT was 21% in Schaffler 2001 and 4% in Kaper 2003. Furthermore, the interventions varied in the extent of financial benefit, the methods of smoking cessation treatment for which the benefit was available, the conditions for receiving the benefit and the information concerning the new benefit. In four of the six studies, a financial benefit was available for different types of smoking cessation treatment. As the effect of the financial intervention can be spread out over the different types of products, studies with a financial benefit for more than one type cannot formally be compared with studies that offered a financial benefit for only one product. Similarly, studies which offered a benefit for two different types of smoking cessation treatment cannot be compared with the study that offered a benefit for three different types. Since participants in four studies could use more than one type of product, summing the use of the different products could overestimate the number of smokers who used smoking cessation treatments. For clarity, we have therefore summarized the effects

by type of smoking cessation treatment. However, one should keep the limitations of this summary in mind.

An example of different conditions for receiving a financial benefit is related to voluntary or obligatory visits to healthcare providers. In Kaper 2003, participants received coverage after a statement of contact with a healthcare provider was sent to the health insurance company. The use of behavioural interventions in Kaper 2003 is therefore not comparable with Schaffler 2001, in which participants voluntarily choose to participate in a behavioural intervention. There were also differences in informing the participants about their benefit. In Boyle 2002, for example, participants were not explicitly informed, and as a result only 30% of smokers in the treatment group knew about the offered financial benefit. Smaller effects were found in Boyle 2002 compared with other studies, in which participants were informed about their new benefit. Patients' awareness of the available benefits could contribute significantly to an increase in the effect of the intervention. Alesci 2004 tested whether a mailing describing the new financial benefit for smoking cessation treatments increased the uptake. Results showed that only 39% of the participants in the intervention group knew about the financial benefit, and that there were no differences in the use of smoking cessation treatments or abstinence compared with the control group, which did not receive the mailing.

Methodological quality

Only two of the seven studies scored positively on more than half of the quality checklist items. An important limitation was that not all of the studies used random or concealed allocation. Only five of the seven studies randomly allocated the participants to the treatment or control groups, and only two of those concealed the allocation. In the remaining studies, the possibility exists that the effect is biased. Furthermore, not all the studies blinded the participants, healthcare providers or outcome assessors. Only three of the seven studies blinded the participants. In studies which assess the effect of a financial intervention, blinding the control group may be important, since control participants who knew that they would not receive a financial benefit for treatment might feel disadvantaged and change their behaviour. Such a change would be a threat to the internal validity of the study. Only one study explicitly blinded the healthcare provider and three studies blinded the outcome assessors. We therefore cannot rule out the possibility of biased results in the unblinded studies. Excluding one study which scored only 5/15 changed the results of one of the three outcomes from significant to non-significant. This may be due to a decrease in power.

Another methodological problem is the low follow-up rate, which was below 80% in all of the included studies, and may be related to the intervention. If participants are less interested in the financial intervention, for example, when they do not want to use smoking cessation treatments or are not motivated to quit, then the number of drop-outs can increase. In an intention-to-treat analysis, drop-

outs would be considered to be continuing smokers. However, intention to treat analyses were not performed by four of the included studies. For this review, we have recalculated the results of those studies on an intention-to-treat basis.

All abstinence outcomes were based on self-reported smoking status, although we would have preferred to use biochemically validated outcomes. Only two studies biochemically validated participants' smoking status (Dey 1999; Kaper 2003). Dey 1999 was not eligible for the abstinence comparison because follow-up was at 14 weeks rather than six months, and in Kaper 2003 only 57% of the self-reported quitters had their status biochemically validated. Those outcomes were therefore not reported in this review. It is possible that reliance on self-report could have introduced bias, as participants who were benefiting from free treatment might be more likely to give socially desirable answers than participants in the control group.

We used a separate methodological quality assessment for the economic evaluation; the Consensus Health Economic Criteria (CHEC) list (Donaldson 2002). We preferred to use two separate lists to be able to cover all items, which we considered important. From the methodological quality assessment of the economic evaluations, it became clear that none of the three studies reporting on cost effectiveness had performed a full economic evaluation. Only costs of the intervention were calculated. Other important data like duration and number of contacts with healthcare providers and sources of cost valuation were not presented. No study examined cost effectiveness in terms of quality-adjusted life years saved. Results were presented in terms of costs per additional quitter or costs per person enrolled. Furthermore, no assessment was made for uncertainty in the estimation of costs and consequences, and no incremental analyses were performed. As a result, a precise estimate of the costs cannot be presented and no comparisons can be made with economic evaluations of other preventive healthcare treatments.

AUTHORS' CONCLUSIONS

Implications for practice

In this review, covering the full cost to smokers of using smoking cessation treatment increased the number of successful quitters, the number of participants making a quit attempt and the use of smoking cessation treatment at low cost when compared with a partial benefit or no financial intervention. Since the methodological quality scores of the majority of the studies were low, and there was heterogeneity between the settings, interventions and

participants of the included studies, the results should be interpreted cautiously. The differences in self-reported abstinence rate, number of participants making a quit attempt and use of smoking cessation treatments were only small.

Implications for research

More randomized controlled trials should be performed that are comparable with the studies that are included in this review, so that future analyses can be stratified on setting, intervention and participants. Only one randomized trial examined the effects of financing systems directed at healthcare providers and did not detect an effect on patients' smoking status. More randomized trials should assess whether financial interventions aimed at healthcare providers can affect the prescribing pattern and uptake for smoking cessation treatments, or the smoking behaviour of their patients. Furthermore, no full economic evaluations have been performed. To assess the financial impact of healthcare financing interventions for smoking cessation, it is important to determine more precisely the cost effectiveness of these interventions. A full economic evaluation is needed to be able to compare the cost effectiveness with other preventive healthcare treatments.

POTENTIAL CONFLICT OF INTEREST

The authors conducted one of the trials included in the review.

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*Indicates the major publication for the study

TABLES

Characteristics of included studies

Study	Boyle 2002
Methods	Setting: employer groups insured at the Blue Cross Blue Shield of Minnesota and Health Partners, USA, in 1999 Design: non-randomized controlled trial
Participants	1. Treatment group: 2339; 2. Control group 1364 Smokers identified by postal questionnaire. Exclusions: <100 cigarettes a life time, unclear health insurance status, already quit smoking or unable to complete the survey because of illness. Av age 46, F=56%; daily smokers 91%. 46% interested in quitting over next 30 days
Interventions	Treatment group: full coverage (only with a provider's prescription) for nicotine gum, nicotine patch and bupropion. Control group: no pharmacotherapy
Outcomes	a) Self-reported 12m continuous abstinence (no smoking for last 6m+) b) Self-reported quit attempt for at least 1 day c) Utilization of tobacco dependence treatment
Notes	In the treatment group only 30.3% was aware of the pharmacy benefit No economic evaluation was performed.
Allocation concealment	C – Inadequate

Study	Curry 1998
Methods	Setting: consumer-owned HMO (Group Health Cooperative of Puget Sound) USA, 1993-4 Design: longitudinal natural design (pre-post) with four coverage groups
Participants	1. Standard coverage (controls) n = 6133 2. Full coverage n = 2767 3. Flipped coverage n = 1769 4. Reduced coverage n = 6253 Enrollees in Group Health Cooperative aged 18 - 64 yrs. av age 42; F 53%;
Interventions	1. Standard coverage group: 50% co-payment for the behavioural programme and full coverage of NRT in both year 1 and 2. 2. Full coverage group: full coverage of the behavioural programme and full coverage of NRT, only in year 2. 3. Flipped coverage: full coverage of the behavioural programme and a 50% co-payment for NRT, only in year 2. 4. Reduced coverage group: a 50% co-payment for the behavioural program and a 50% co-payment for NRT in year 1. A payment of \$5 per prescription was not included in the coverage.
Outcomes	a) Self-reported 7-days PP abstinence at 6m, for the behavioural participants only b) Automated data collection of the use of smoking cessation treatment, for behavioural participants only
Notes	Comparison of abstinence between full coverage and reduced coverage (50% coverage for both NRT and the behavioural program) in year 2 Comparison of use of smoking cessation treatment, between full and flipped coverage groups, and between full and standard coverage groups in year 2. An economic evaluation was performed using the third party payer perspective and users' perspective. The costs per benefit user who quit smoking were reported.
Allocation concealment	C – Inadequate

Characteristics of included studies (Continued)

Study	Dey 1999
Methods	Setting: general practices in East Lancashire, UK, in 1996 Design: randomized controlled trial, allocation through an off-site randomization system
Participants	1. Treatment group n = 64; 2. Control group n = 58 age range 25-64 yrs, av age 43; F = 56%. Participants were motivated to quit smoking; cpd >15
Interventions	Treatment group: free prescriptions for 12w of nicotine patches. Control group: 12w of nicotine patches at slightly reduced retail price.
Outcomes	a) Biochemically validated abstinence from 8-14w; salivary cotinine level < 14 ng/ml, CO level < 10 ppm at 14w b) Use of tobacco dependence treatment (cashing in one or more NRT prescriptions) No economic evaluation was performed.
Notes	Study not used for assessing impact on abstinence because follow-up period was less than 6 months.
Allocation concealment	A – Adequate

Study	Hughes 1991
Methods	Setting: 2 rural family practices, Vermont USA, probably 1989/1990. Design: randomized controlled trial, allocation by sealed envelopes
Participants	1. Treatment group 1: n = 32; 2. Treatment group 2: n = 36; 3. Control group: n = 38 Participants aged 18+, av age 38 years; F = 52%; av 26 cpd; no previous use of nicotine gum
Interventions	Treatment group 1: full coverage for nicotine gum. Treatment group 2: partial coverage, and nicotine gum @ US\$6 a box. Control group: (almost) no coverage, and nicotine gum @ US\$20 per box. All participants also received brief quit smoking advice according to the 5 A's.
Outcomes	a) Self-reported 6m PP abstinence (77% biochemically validated) b) Self-reported quit attempts during 6m post-entry c) Utilization of tobacco dependence treatment, by prescription dates and number of unused gum pieces An economic evaluation was performed according to a third party payer perspective. The costs were presented per subject enrolled. Also the monetary benefits from smoking cessation were calculated.
Notes	
Allocation concealment	A – Adequate

Study	Kaper 2003
Methods	Setting: smokers insured by health insurance company “De Friesland”, The Netherlands, in 2002. Design: randomized controlled trial
Participants	1. Treatment group: n = 632 2. Control group: n = 634 Participants aged 18+ yrs. av age 40; F= 45%, 87% daily smokers. Participants did not have to be motivated to quit.
Interventions	Treatment group: offer of reimbursement for 6m for NRT, bupropion and behavioural counseling, measured as 2 contacts with a health professional. Control group: no reimbursement offered
Outcomes	a) Self-reported 12m CA (i.e. abstinence at both 6m and 12m); 24/35 biochemically validated b) Self-reported quit attempt (i.e. no smoking for at least 24 hrs); 6/18 biochemically validated c) Self-reported use of tobacco dependence treatment An economic evaluation will be performed in 2004.
Notes	
Allocation concealment	C – Inadequate

Study	Roski 2003
Methods	Setting: 40 clinics of a multispecialty medical group practice, in Washington DC, USA in 1999-2000. Design: randomized controlled trial with three groups of which two are included in the review.
Participants	1. Treatment group: n = 13 clinics 2. Control group: n = 15 clinics. The measurements consisted of a baseline and follow up survey concerning 2799 smokers aged 18+ yrs.
Interventions	Treatment group: guideline dissemination, financial incentives for reaching preset clinical performance targets. Control group: guideline dissemination
Outcomes	a) Self-reported 6m PP abstinence (i.e. no smoking previous 7 days) b) Utilization of tobacco dependence treatment
Notes	No corrections were made for clustering.
Allocation concealment	B – Unclear

Study	Schauffler 2001
Methods	Setting: 16 large companies offering employee health benefits from 2 California HMOs, in California, USA, in 1998. Design: randomized controlled trial, pre-test post-test assessments
Participants	1. Treatment group: n = 601 2. Control group: n = 603 Participants aged 18+ yrs, current smokers, smoked >100 cigarettes in their life time. Demographic data not reported, but no significant differences detected between 2 study arms. Smokers were under no obligation to quit smoking.
Interventions	Treatment group: free self-help kit, 4 free orders of nicotine gum or patches during 1yr and coverage of a behaviour group programme. Control group: free self-help kit only.
Outcomes	a) Self-reported 12m PP (i.e. no smoking previous 7 days) b) self-reported quit attempt (i.e. not having smoked for 1 or more days over the 12m) c) Utilization of tobacco dependence treatment An economic evaluation was performed according to a third party payer perspective.

Notes

Allocation concealment B – Unclear

av = average (mean); w = weeks; m = month; F = female; PP = point prevalence; CA = continuous abstinence; cpd = cigarettes per day; CO = carbon monoxide; NRT = nicotine replacement therapy

Characteristics of excluded studies

Study	Reason for exclusion
Amundson 2003	Not a (randomized) controlled trial or interrupted time series
Coleman 2001	Not a (randomized) controlled trial or interrupted time series
Cox 1990	Not a (randomized) controlled trial or interrupted time series
Curry 1991	The financial incentive was not related to the use of smoking cessation treatment
Doescher 2002	Not a (randomized) controlled trial or interrupted time series
Donatelle 2000	The financial incentive was not related to the use of tobacco dependence treatment
Fiore 2000	Not a (randomized) controlled trial or interrupted time series
Hays 1999	The effect of a financial incentive was not assessed
Hovell 1996	Trial was to prevent adolescent smoking, not for cessation. Russos 1999 is a secondary publication of data from this trial

Characteristics of excluded studies (Continued)

Latts 2002	Not a (randomized) controlled trial or interrupted time series
Lave 1996	No data was available of the control group
Oswald 1988	Not a (randomized) controlled trial or interrupted time series
Pardell 2003	The financial incentive was not related to the use of tobacco dependence treatment
Parnes 2002	Not a (randomized) controlled trial or interrupted time series
Ringen 2002	Not a (randomized) controlled trial or interrupted time series
Russos 1999	The financial incentive was not related to the use of tobacco dependence treatment, and outcome was % of adolescents counselled, not cessation. This is a secondary publication of Hovell 1996
Shaw 2003	Data concerning the outcome measures are not yet available
Solberg 2002	Not a (randomized) controlled trial or interrupted time series
Stone 2002	Not a (randomized) controlled trial or interrupted time series

ADDITIONAL TABLES

Table 01. Quality assessment

Nr.	Item	Boyle 2002	Curry 1998	Dey 1999	Hughes 1991	Kaper 2004	Roski 2003	Schauffer 2001
1	Was a method of randomisation performed?	no	no	yes	yes	yes	yes	yes
2	Was the allocation concealed?	no	no	yes	yes	no	unclear	unclear
3	Blinding or naïve patient?	no	no	no	no	yes	yes	yes
4	Blinding of patient evaluated and successful?	no	no	no	no	yes	no	no
5	Blinding or naïve health care provider?	no	yes	no	no	no	no	unclear
6	Blinding of health care provider evaluated and successful?	no	no	no	no	no	no	no
7	Blinding or naïve outcome assessor?	yes	yes	unclear	yes	no	no	unclear
8	Blinding of outcome	no	no	no	no	no	no	no

Table 01. Quality assessment (Continued)

Nr.	Item	Boyle 2002	Curry 1998	Dey 1999	Hughes 1991	Kaper 2004	Roski 2003	Schauffler 2001
	assessor evaluated and successful?							
9	Were both inclusion and exclusion criteria specified?	yes	yes	yes	yes	yes	yes	yes
10	Were the groups similar at baseline regarding the most important prognostic indicators?	unclear	unclear	yes	yes	yes	yes	yes
11	Was in one or more groups the percentage follow-up over 80%?	no	no	no	no	no	no	no
12	Were the co-interventions comparable between the groups? (no co-interventions = yes)	yes	yes	yes	yes	yes	yes	yes
13	Did the analysis include an intention-to-treat analyses?	no	yes	no	yes	yes	no	no
14	Were the primary outcome measures specified?	yes	yes	yes	yes	yes	yes	yes
15	Were point estimates and measures of variability presented for primary outcome	yes	yes	yes	yes	yes	yes	yes

Table 01. Quality assessment (Continued)

Nr.	Item	Boyle 2002	Curry 1998	Dey 1999	Hughes 1991	Kaper 2004	Roski 2003	Schauffler 2001
	measure(s)?							
	Total score	5	7	7	9	9	7	7

Table 02. Quality assessment of economic evaluations

Item	Curry 1998	Hughes 1991	Schauffler 2001
1. Is the study population clearly described?	no	yes	no
2. Are competing alternatives clearly described?	yes	yes	yes
3. Is a well-defined research question posed in answerable form?	yes	yes	yes
4. Is the economic study design appropriate to the stated objective?	yes	yes	yes
5. Is the chosen time horizon appropriate in order to include relevant costs and consequences?	yes	yes	yes
6. Is the actual perspective chosen appropriate?	yes	yes	no
7. Are all important and relevant costs for each alternative identified?	no	no	no
8. Are all costs measured appropriately in physical units?	no	no	no
9. Are costs valued appropriately?	no	no	no
10. Are all important and relevant outcomes for each alternative identified?	no	no	no
11. Are all outcomes measured appropriately?	no	yes	no
12. Are outcomes valued appropriately?	yes	yes	yes
13. Is an incremental analysis of costs and outcomes of alternatives performed?	no	no	no
14. Are all future costs and outcomes discounted appropriately?	yes	yes	yes
15. Are all important variables appropriately subjected to sensitivity analysis?	no	no	no
16. Do the conclusions follow from the data reported?	yes	no	yes
17. Does the study discuss the generalizability of the results to others settings/ patients?	no	yes	yes
18. Does the article indicate that there is no potential conflict of interest of reseachers and funders?	no	no	no
19. Are ethical and distributional issues discussed appropriately?	no	no	no
Total score	8	10	8

ANALYSES

Comparison 01. self-reported abstinence from smoking at at least 6 months

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 full versus no financial coverage	4	6243	Odds Ratio (Random) 95% CI	1.48 [1.17, 1.88]
02 full versus partial financial coverage (point prevalence)	2	9088	Odds Ratio (Random) 95% CI	2.49 [1.59, 3.90]
03 partial versus no financial coverage (point prevalence)			Odds Ratio (Random) 95% CI	Totals not selected

Comparison 02. quit attempt for at least 24 h

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 full versus no financial coverage	4	6243	Odds Ratio (Random) 95% CI	1.32 [1.18, 1.49]
02 full versus partial financial coverage			Odds Ratio (Random) 95% CI	Totals not selected
03 partial versus no financial coverage			Odds Ratio (Random) 95% CI	Totals not selected

Comparison 03. utilization of tobacco dependence treatment

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 full versus no financial coverage			Odds Ratio (Random) 95% CI	Subtotals only
02 full versus partial financial coverage			Odds Ratio (Random) 95% CI	Subtotals only
03 partial versus no financial coverage			Odds Ratio (Random) 95% CI	Totals not selected

Comparison 04. financial interventions directed at healthcare providers

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 self-reported point prevalence abstinence			Odds Ratio (Random) 95% CI	Totals not selected
02 use of nicotine replacement therapy and/or bupropion			Odds Ratio (Random) 95% CI	Totals not selected
03 behavioural interventions			Odds Ratio (Random) 95% CI	Totals not selected

INDEX TERMS

Medical Subject Headings (MeSH)

Cost-Benefit Analysis; *Financing, Government; *Insurance Coverage; Randomized Controlled Trials; Smoking [*therapy]; Smoking Cessation [economics]; Tobacco Use Cessation [*economics]; Tobacco Use Disorder [economics; *therapy]

MeSH check words

Humans

COVER SHEET

Title	Healthcare financing systems for increasing the use of tobacco dependence treatment
Authors	Kaper J, Wagena EJ, Severens JL, Van Schayck CP
Contribution of author(s)	J Kaper and EJ Wagena proposed the idea of the review, selected studies, assessed the quality of the included studies and extracted data. J Kaper and JL Severens assessed the quality of the economic evaluation and extracted data of the cost analyses. J Kaper wrote the review. EJ Wagena, JL Severens and CP van Schayck critically commented on several drafts of the review.
Issue protocol first published	2003/3
Review first published	2005/1
Date of most recent amendment	23 May 2005
Date of most recent SUBSTANTIVE amendment	16 November 2004
What's New	Information not supplied by author
Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author
Date new studies found and included/excluded	Information not supplied by author
Date authors' conclusions section amended	Information not supplied by author
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DOI	10.1002/14651858.CD004305.pub2
Cochrane Library number	CD004305
Editorial group	Cochrane Tobacco Addiction Group
Editorial group code	HM-TOBACCO

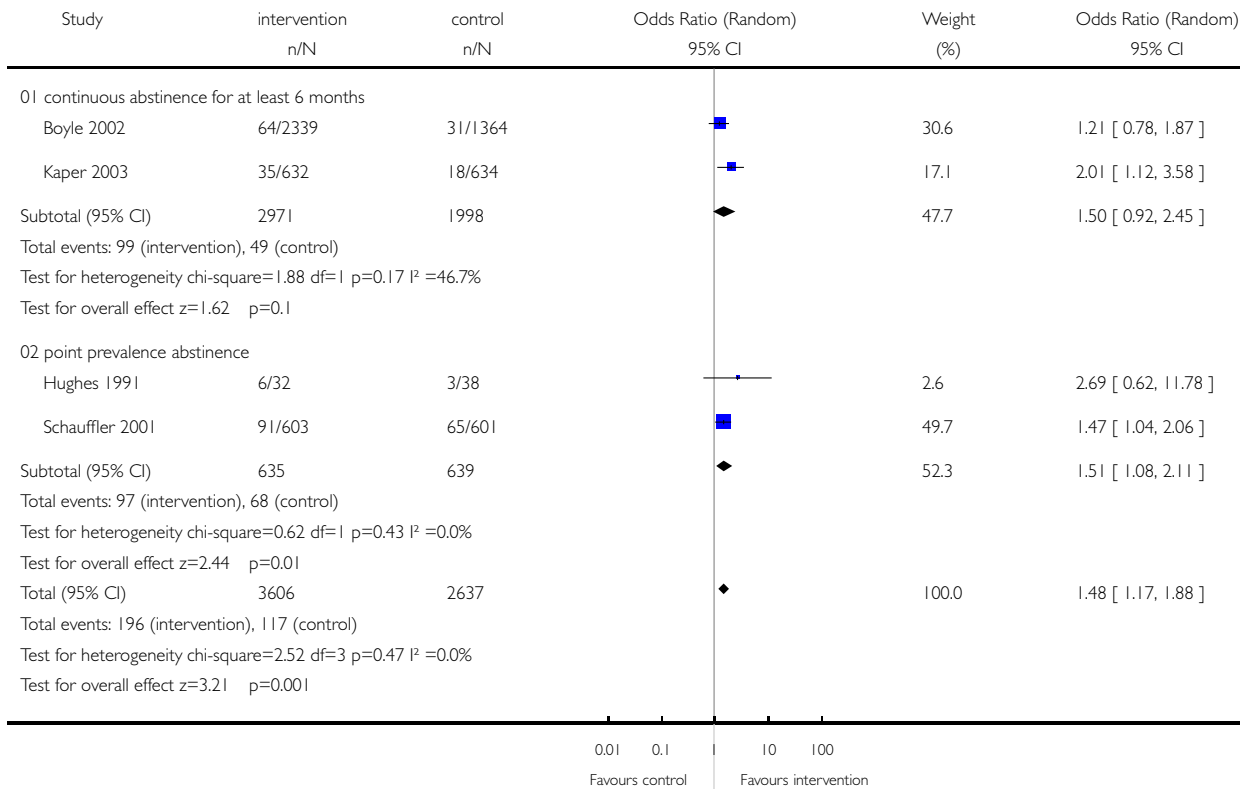
GRAPHS AND OTHER TABLES

Analysis 01.01. Comparison 01 self-reported abstinence from smoking at at least 6 months, Outcome 01 full versus no financial coverage

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 01 self-reported abstinence from smoking at at least 6 months

Outcome: 01 full versus no financial coverage

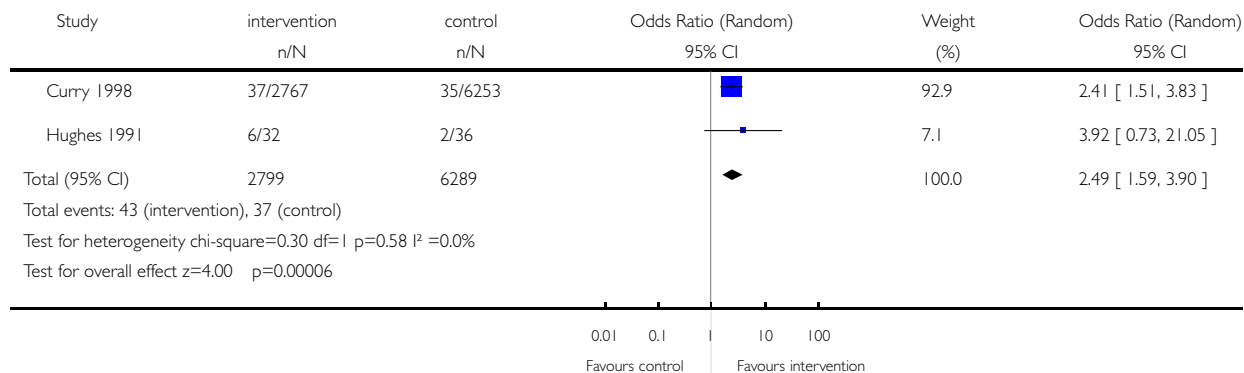


Analysis 01.02. Comparison 01 self-reported abstinence from smoking at at least 6 months, Outcome 02 full versus partial financial coverage (point prevalence)

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 01 self-reported abstinence from smoking at at least 6 months

Outcome: 02 full versus partial financial coverage (point prevalence)

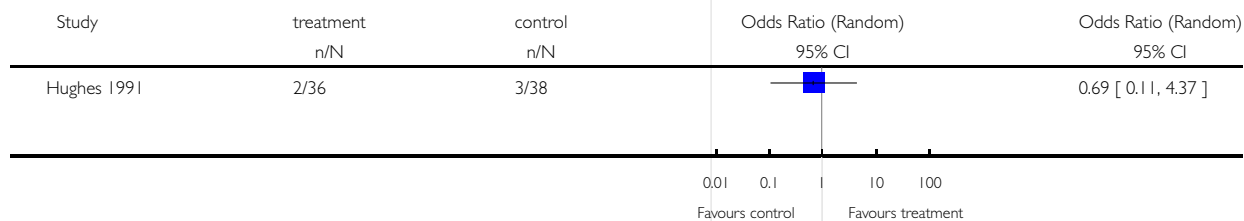


Analysis 01.03. Comparison 01 self-reported abstinence from smoking at at least 6 months, Outcome 03 partial versus no financial coverage (point prevalence)

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 01 self-reported abstinence from smoking at at least 6 months

Outcome: 03 partial versus no financial coverage (point prevalence)

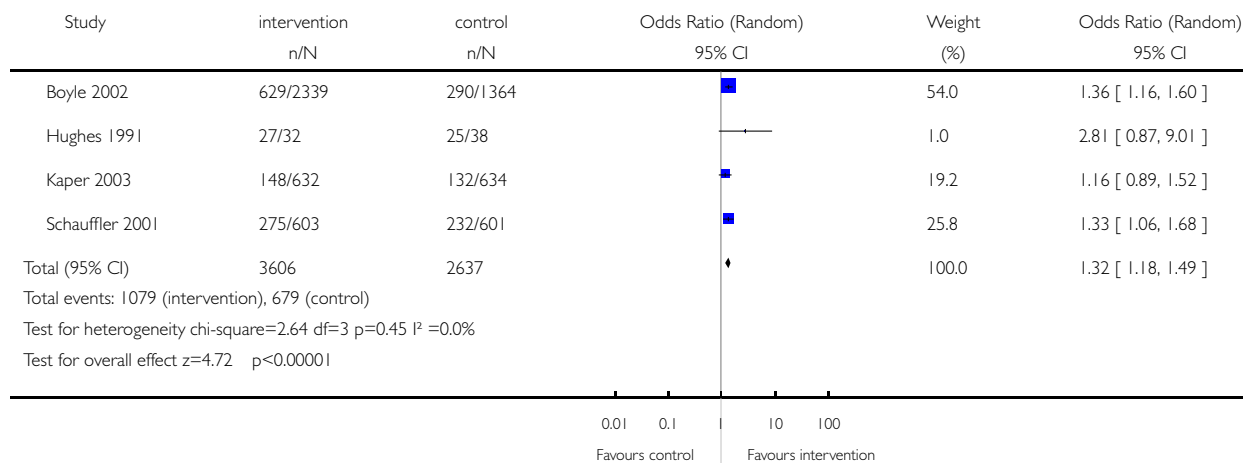


Analysis 02.01. Comparison 02 quit attempt for at least 24 h, Outcome 01 full versus no financial coverage

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 02 quit attempt for at least 24 h

Outcome: 01 full versus no financial coverage

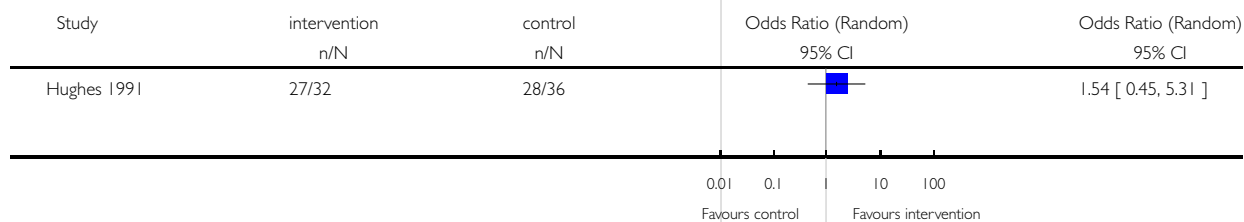


Analysis 02.02. Comparison 02 quit attempt for at least 24 h, Outcome 02 full versus partial financial coverage

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 02 quit attempt for at least 24 h

Outcome: 02 full versus partial financial coverage

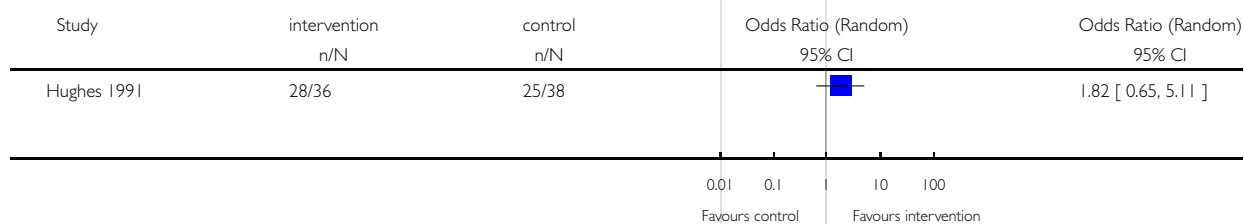


Analysis 02.03. Comparison 02 quit attempt for at least 24 h, Outcome 03 partial versus no financial coverage

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 02 quit attempt for at least 24 h

Outcome: 03 partial versus no financial coverage

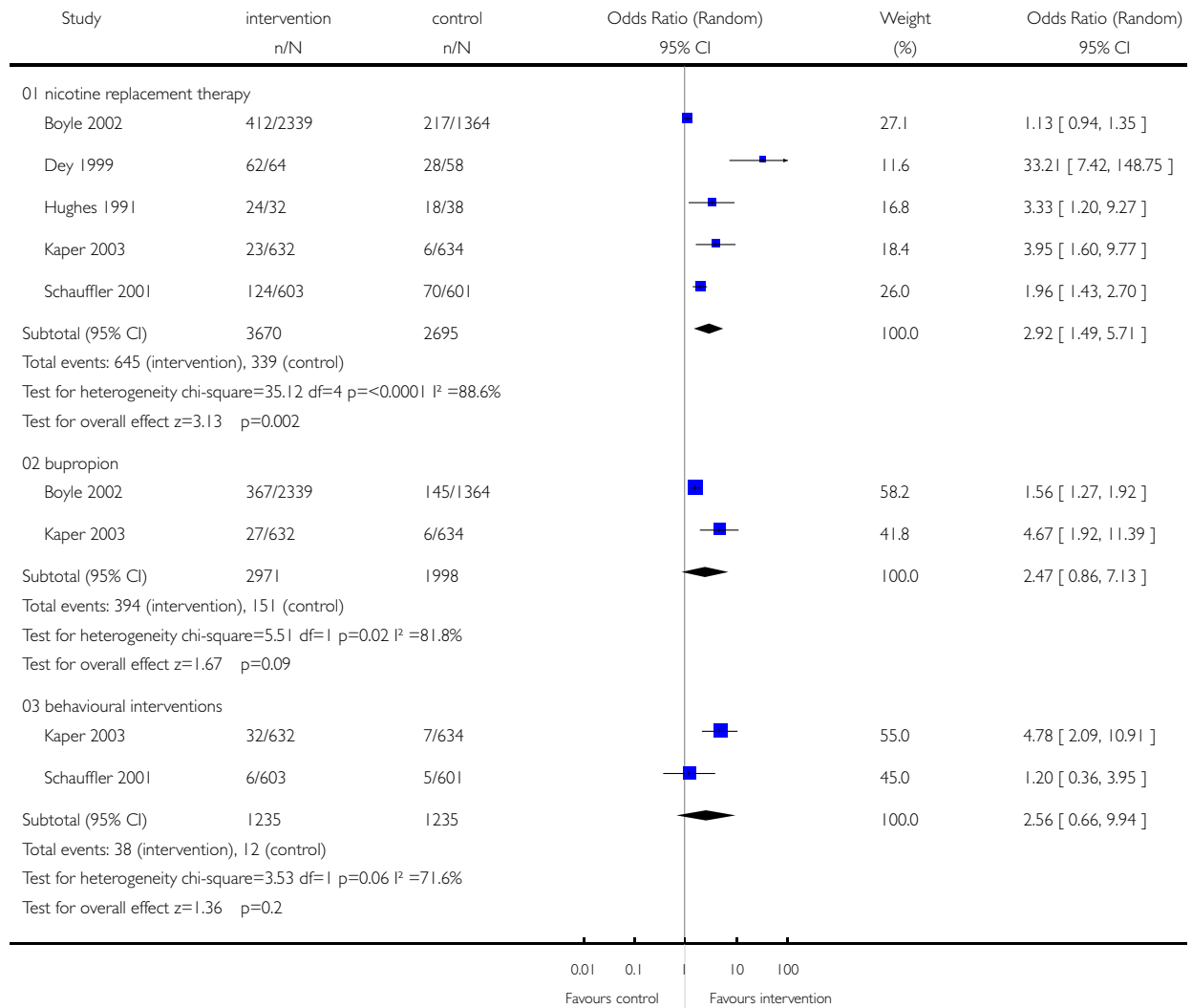


Analysis 03.01. Comparison 03 utilization of tobacco dependence treatment, Outcome 01 full versus no financial coverage

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 03 utilization of tobacco dependence treatment

Outcome: 01 full versus no financial coverage

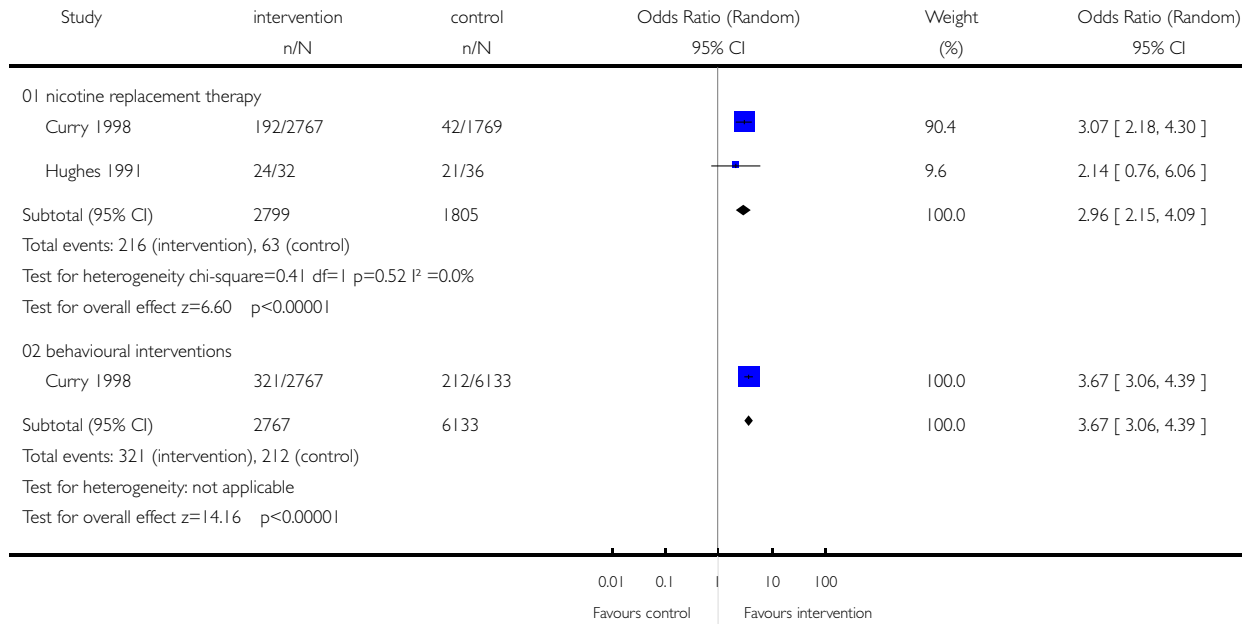


Analysis 03.02. Comparison 03 utilization of tobacco dependence treatment, Outcome 02 full versus partial financial coverage

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 03 utilization of tobacco dependence treatment

Outcome: 02 full versus partial financial coverage

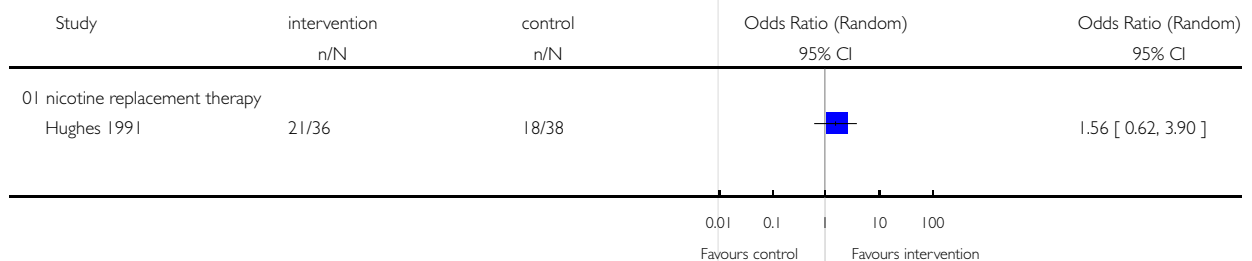


Analysis 03.03. Comparison 03 utilization of tobacco dependence treatment, Outcome 03 partial versus no financial coverage

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 03 utilization of tobacco dependence treatment

Outcome: 03 partial versus no financial coverage

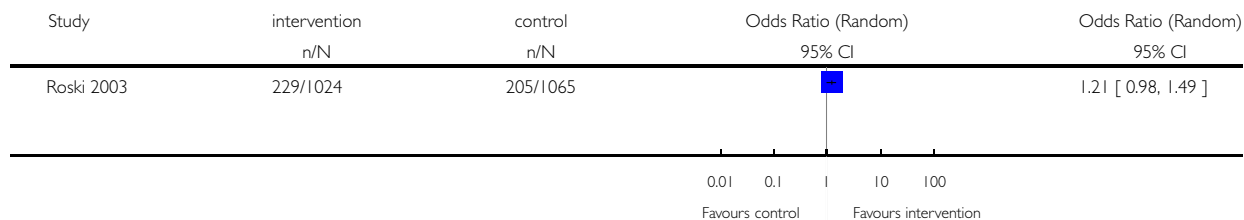


Analysis 04.01. Comparison 04 financial interventions directed at healthcare providers, Outcome 01 self-reported point prevalence abstinence

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 04 financial interventions directed at healthcare providers

Outcome: 01 self-reported point prevalence abstinence

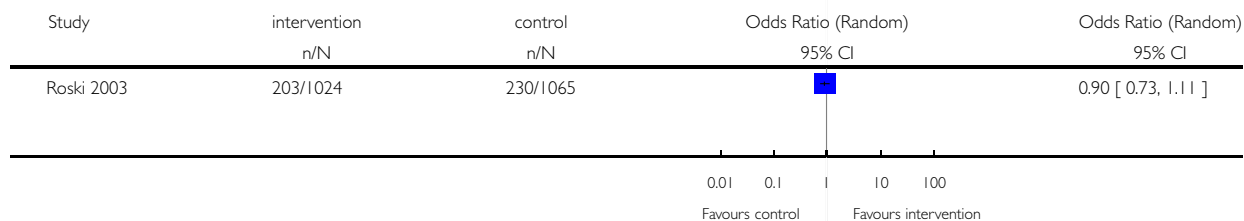


Analysis 04.02. Comparison 04 financial interventions directed at healthcare providers, Outcome 02 use of nicotine replacement therapy and/or bupropion

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 04 financial interventions directed at healthcare providers

Outcome: 02 use of nicotine replacement therapy and/or bupropion



Analysis 04.03. Comparison 04 financial interventions directed at healthcare providers, Outcome 03 behavioural interventions

Review: Healthcare financing systems for increasing the use of tobacco dependence treatment

Comparison: 04 financial interventions directed at healthcare providers

Outcome: 03 behavioural interventions

