Nursing interventions for smoking cessation (Review)

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[Intervention Review]

Nursing interventions for smoking cessation

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ABSTRACT

Background

Healthcare professionals, including nurses, frequently advise patients to improve their health by stopping smoking. Such advice may be brief, or part of more intensive interventions.

Objectives

To determine the effectiveness of nursing-delivered smoking cessation interventions.

Search strategy

We searched the Cochrane Tobacco Addiction Group specialized register and CINAHL in July 2007.

Selection criteria

Randomized trials of smoking cessation interventions delivered by nurses or health visitors with follow up of at least six months.

Data collection and analysis

Two authors extracted data independently. The main outcome measure was abstinence from smoking after at least six months of follow up. We used the most rigorous definition of abstinence for each trial, and biochemically validated rates if available. Where statistically and clinically appropriate, we pooled studies using a Mantel-Haenszel fixed effect model and reported the outcome as a risk ratio (RR) with 95% confidence interval (CI).

Main results

Forty-two studies met the inclusion criteria. Thirty-one studies comparing a nursing intervention to a control or to usual care found the intervention to significantly increase the likelihood of quitting (RR 1.28, 95% CI 1.18 to 1.38). There was heterogeneity among the study results, but pooling using a random effects model did not alter the estimate of a statistically significant effect. In a subgroup analysis there was weaker evidence that lower intensity interventions were effective (RR 1.27, 95% CI 0.99 to 1.62). There was limited indirect evidence that interventions were more effective for hospital inpatients with cardiovascular disease than for inpatients with other conditions. Interventions in non-hospitalized patients also showed evidence of benefit. Nine studies comparing different nurse-delivered interventions failed to detect significant benefit from using additional components. Five studies of nurse counselling on smoking cessation during a screening health check, or as part of multifactorial secondary prevention in general practice (not included in the main meta-analysis) found nursing intervention to have less effect under these conditions.

Authors' conclusions

The results indicate the potential benefits of smoking cessation advice and/or counselling given by nurses to patients, with reasonable evidence that intervention is effective. The evidence of an effect is weaker when interventions are brief and are provided by nurses whose main role is not health promotion or smoking cessation. The challenge will be to incorporate smoking behaviour monitoring and smoking cessation interventions as part of standard practice, so that all patients are given an opportunity to be asked about their tobacco use and to be given advice and/or counselling to quit along with reinforcement and follow up.

PLAIN LANGUAGE SUMMARY

Does support and intervention from nurses help people to stop smoking

Most smokers want to quit, and may be helped by advice and support from healthcare professionals. Nurses are the largest healthcare workforce, and are involved in virtually all levels of health care. This review of clinical trials covered 42 studies, with more than 15,000 participants included in the analyses. It found that advice and support from nursing staff could increase people's success in quitting smoking, especially in a hospital setting. Similar advice and encouragement given by nurses at health checks or prevention activities seems to be less effective, but may still have some impact.

BACKGROUND

Tobacco-related deaths and disabilities are on the increase worldwide, because of continued use of tobacco (mainly cigarettes). Tobacco use has reached epidemic proportions in many developing countries, while steady use continues in industrialized nations (Davis 2007; West 2006; DHHS 2004). The following two factors may help to reduce the prevalence of cigarette smoking: (1) 79% to 90% (Coultas 1991) of smokers want to quit smoking (NIH 2006) and (2) 70% of smokers visit a healthcare professional each year (Cherry 2003). Nurses, with the largest number of healthcare providers worldwide, are involved in the majority of these visits and could therefore have a profound effect on the reduction of tobacco use (Percival 2003; Whyte 2003).

Systematic reviews (e.g. Lancaster 2004) have confirmed the effectiveness of advice to stop smoking from physicians. The Agency for Health Care Research and Quality Clinical Practice Guideline (AHRQ 2000) notes strong support for physicians to advise every patient who smokes to quit. The findings for advice by non-physician clinicians have been weaker, although the guideline recommends that all clinicians provide interventions. A review of nursing's role in smoking cessation is essential if the profession is to endorse the American Nurses Association position, "...patient education and preventive healthcare interventions to stop tobacco use should be part of nursing practice" (ANA 1995).

The aim of this review is to examine and summarize randomized clinical trials where nursing provided smoking cessation interventions. The review therefore focuses on the nurse as the intervention provider, rather than on a particular type of intervention. Smoking cessation targeting pregnant women are not included here, because of the particular circumstance and motivation among these women. Interventions for pregnant smokers have been reviewed elsewhere (Lumley 2004).

OBJECTIVES

The primary objective of this review was to determine the effectiveness of nursing-delivered interventions on smoking behaviour in adults. *A priori* study hypotheses were that nursing-delivered smoking cessation interventions:

(i) are more effective than no intervention

(ii) are more effective if the intervention is more intense

(iii) differ in effectiveness with health state and setting of the participants

(iv) are more effective if they include follow ups

(v) are more effective if they include aids that demonstrate the pathophysiological effect of smoking

This review does not address the incremental effects of providing nicotine replacement therapy (NRT) by nurses, as NRT effectiveness is addressed in a separate Cochrane review (Stead 2008). Studies in which advice about nicotine replacement was part of the nursing intervention are included.

METHODS

Criteria for considering studies for this review

Types of studies

Inclusion criteria for studies were:
(i) they had to have at least two treatment groups
(ii) allocation to treatment groups must have been stated to be 'random'
Studies that used historical controls were excluded.

Types of participants

Participants were adult smokers, 18 years and older, of either gender and recruited in any type of healthcare setting. The only exceptions were studies that had exclusively recruited pregnant women. Trials in which 'recent quitters' were classified as smokers were included, but sensitivity analyses were performed to determine whether they differed from trials that excluded such individuals.

Types of interventions

Nursing intervention was defined as the provision of advice, counselling, and/or strategies to help patients quit smoking. The review includes cessation studies that compared usual care with an intervention, brief advice with a more intensive smoking cessation intervention or different types of interventions. Studies of smoking cessation interventions as a part of multifactorial lifestyle counselling or rehabilitation were included only if it was possible to discern the specific nature and timing of the intervention, and to extract data on the outcomes for those who were smokers at baseline. Advice was defined as verbal instructions from the nurse to 'stop smoking' whether or not information was provided about the harmful effects of smoking. Interventions were grouped into low and high intensity for comparison. Low intensity was defined as trials where advice was provided (with or without a leaflet) during a single consultation lasting 10 minutes or less with up to one follow-up visit. High intensity was defined as trials where the initial contact lasted more than 10 minutes, there were additional materials (e.g. manuals) and/or strategies other than simple leaflets, and usually participants had more than one follow-up contact. Studies where patients were randomized to receive advice versus advice plus some form of nicotine replacement therapy (NRT) were excluded, since these were primarily comparisons of the effectiveness of NRT rather than nursing interventions.

Types of outcome measures

The principal outcome was smoking cessation rather than a reduction in withdrawal symptoms, or reduction in number of cigarettes smoked. Trials had to report follow up of at least six months for inclusion in the review. We excluded trials which did not include data on smoking cessation rates. We used the strictest available criteria to define abstinence in each study, e.g. sustained cessation rather than point prevalence. Where biochemical validation was used, only participants meeting the biochemical criteria for cessation were regarded as abstainers. Participants lost to follow up were regarded as continuing smokers (intention-to-treat analyses).

Search methods for identification of studies

We searched the Tobacco Addiction Review Group specialized register for trials (most recent search July 2007). This register includes trials located from systematic search of MEDLINE, EMBASE and PsycINFO and hand searching of specialist journals, conference proceedings, and reference lists of previous trials and overviews. We checked all trials with 'nurse' or 'health visitor' in the title, abstract, or keywords for relevance. We also searched the Cumulative Index to Nursing and Allied Health Literature (CINAHL) on OVID for 'nursing' and 'smoking cessation' from 1983 to July 2007.

Data collection and analysis

Data extraction
The authors extracted data from the published reports independently. Disagreements were resolved by referral to a third person. For each trial, the following data were extracted: (i) author(s) and year; (ii) country of origin, study setting, and design; (iii) number and characteristics of participants and definition of 'smoker'; (iv) description of the intervention and designation of its intensity (high or low); and (v) outcomes and biochemical validation. In trials where the details of the methodology were unclear or where the results were expressed in a form that did not allow for extraction of key data, we approached the original investigators for additional information. We treated participants lost to follow up as continuing smokers. We excluded from totals only those participants who died before follow up or were known to have moved to an untraceable address.
Quality Assessment
We assessed the studies in relation to the four general sources of bias described in the Cochrane Handbook.

(i) selection bias - systematic differences in the securing of the comparison groups
(ii) performance bias - systematic differences in care apart from the intervention of interest
(iii) attrition bias - systematic withdrawals from the trial
(iv) detection bias - systematic differences in outcome assessment
Only the control of selection bias at entry has been shown empirically to result in systematic differences in the assessment of effect size (Schulz 1995). We used a three-point scale, with a grading of A if the effort to control selection bias had been optimal (e.g. a randomly-generated table of assignment established before contact with potential participants); a grading of B if there was uncertainty as to how and when random assignments had been made, and a grading of C if group allocation had definitely not been adequately concealed.

Data Analysis

Following changes to the Cochrane Tobacco Addiction Group's recommended method of data analysis since this review was last updated, we have changed the way in which we summarise the effects of treatment. We now use the risk ratio rather than the odds ratio for summarising individual trial outcomes and for the estimate of the pooled effect. Treatment effects will seem larger when expressed as odds ratios than when expressed as risk ratios, unless the event rates are very low. For example, if 20 out of 100 participants have quit in the intervention group, and 10 out of 100 in the control group the risk ratio is 2.0 [(20/100)/(10/100)], whilst the odds ratio is 2.25 [(20/80)/(10/90)]. Whilst there are circumstances in which odds ratios may be preferable, there is a danger that they will be interpreted as if they are risk ratios, making the treatment effect seem larger (Deeks 2006). Where we judged a group of studies to be sufficiently clinically and statistically homogenous we used the Mantel-Haenszel fixed-effect method (Greenland 1985) to calculate a weighted average of the risk ratios of the individual trials, with 95% confidence intervals. To assess statistical heterogeneity between trials we used the I^2 statistic (Higgins 2003). This measures the percentage of total variation across studies due to heterogeneity rather than to chance. Values of I^2 over 75% indicate a considerable level of heterogeneity. We append the Cochrane Tobacco Addiction Group's Glossary of tobacco-related terms as an additional table (Table 1).

Table 1. Glossary of terms

Term	Definition
Abstinence	A period of being quit, i.e. stopping the use of cigarettes or other tobacco products, May be defined in various ways; see also: point prevalence abstinence; prolonged abstinence; continuous/sustained abstinence
Biochemical verification	Also called 'biochemical validation' or 'biochemical confirmation': A procedure for checking a tobacco user's report that he or she has not smoked or used

Table 1. Glossary of terms (*Continued*)

	tobacco. It can be measured by testing levels of nicotine or cotinine or other chemicals in blood, urine, or saliva, or by measuring levels of carbon monoxide in exhaled breath or in blood.
Bupropion	A pharmaceutical drug originally developed as an antidepressant, but now also licensed for smoking cessation; trade names Zyban, Wellbutrin (when prescribed as an antidepressant)
Carbon monoxide (CO)	A colourless, odourless highly poisonous gas found in tobacco smoke and in the lungs of people who have recently smoked, or (in smaller amounts) in people who have been exposed to tobacco smoke. May be used for biochemical verification of abstinence.
Cessation	Also called 'quitting' The goal of treatment to help people achieve abstinence from smoking or other tobacco use, also used to describe the process of changing the behaviour
Continuous abstinence	Also called 'sustained abstinence' A measure of cessation often used in clinical trials involving avoidance of all tobacco use since the quit day until the time the assessment is made. The definition occasionally allows for lapses. This is the most rigorous measure of abstinence
'Cold Turkey'	Quitting abruptly, and/or quitting without behavioural or pharmaceutical support.
Craving	A very intense urge or desire [to smoke]. See: Shiffman et al 'Recommendations for the assessment of tobacco craving and withdrawal in smoking cessation trials' Nicotine & Tobacco Research 2004: 6(4): 599-614
Dopamine	A neurotransmitter in the brain which regulates mood, attention, pleasure, reward, motivation and movement
Efficacy	Also called 'treatment effect' or 'effect size': The difference in outcome between the experimental and control groups
Harm reduction	Strategies to reduce harm caused by continued tobacco/nicotine use, such as reducing the number of cigarettes smoked, or switching to different brands or products, e.g. potentially reduced exposure products (PREPs), smokeless tobacco.
Lapse/slip	Terms sometimes used for a return to tobacco use after a period of abstinence. A lapse or slip might be defined as a puff or two on a cigarette. This may proceed to relapse, or abstinence may be regained. Some definitions of continuous, sustained or prolonged abstinence require complete abstinence, but some allow for a limited number or duration of slips. People who lapse are very likely to relapse, but some treatments may have their effect by helping people recover from a lapse.
nAChR	[neural nicotinic acetylcholine receptors]: Areas in the brain which are thought to respond to nicotine, forming the basis of nicotine addiction by stimulating the overflow of dopamine

Table 1. Glossary of terms (*Continued*)

Nicotine	An alkaloid derived from tobacco, responsible for the psychoactive and addictive effects of smoking.
Nicotine Replacement Therapy (NRT)	A smoking cessation treatment in which nicotine from tobacco is replaced for a limited period by pharmaceutical nicotine. This reduces the craving and withdrawal experienced during the initial period of abstinence while users are learning to be tobacco-free The nicotine dose can be taken through the skin, using patches, by inhaling a spray, or by mouth using gum or lozenges.
Outcome	Often used to describe the result being measured in trials that is of relevance to the review. For example smoking cessation is the outcome used in reviews of ways to help smokers quit. The exact outcome in terms of the definition of abstinence and the length of time that has elapsed since the quit attempt was made may vary from trial to trial.
Pharmacotherapy	A treatment using pharmaceutical drugs, e.g. NRT, bupropion
Point prevalence abstinence (PPA)	A measure of cessation based on behaviour at a particular point in time, or during a relatively brief specified period, e.g. 24 hours, 7 days. It may include a mixture of recent and long-term quitters. cf. prolonged abstinence, continuous abstinence
Prolonged abstinence	A measure of cessation which typically allows a 'grace period' following the quit date (usually of about two weeks), to allow for slips/lapses during the first few days when the effect of treatment may still be emerging. See: Hughes et al 'Measures of abstinence in clinical trials: issues and recommendations'; Nicotine & Tobacco Research, 2003: 5 (1); 13-25
Relapse	A return to regular smoking after a period of abstinence
Secondhand smoke	Also called passive smoking or environmental tobacco smoke [ETS] A mixture of smoke exhaled by smokers and smoke released from smouldering cigarettes, cigars, pipes, bidis, etc. The smoke mixture contains gases and particulates, including nicotine, carcinogens and toxins.
Self-efficacy	The belief that one will be able to change one's behaviour, e.g. to quit smoking
SPC [Summary of Product Characteristics]	Advice from the manufacturers of a drug, agreed with the relevant licensing authority, to enable health professionals to prescribe and use the treatment safely and effectively.
Tapering	A gradual decrease in dose at the end of treatment, as an alternative to abruptly stopping treatment
Tar	The toxic chemicals found in cigarettes. In solid form, it is the brown, tacky residue visible in a cigarette filter and deposited in the lungs of smokers.
Titration	A technique of dosing at low levels at the beginning of treatment, and gradually increasing to full dose over a few days, to allow the body to get used to the drug. It is designed to limit side effects.

Table 1. Glossary of terms (*Continued*)

Withdrawal	A variety of behavioural, affective, cognitive and physiological symptoms, usually transient, which occur after use of an addictive drug is reduced or stopped. See: Shiffman et al 'Recommendations for the assessment of tobacco craving and withdrawal in smoking cessation trials' Nicotine & Tobacco Research 2004: 6(4): 599-614

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.

Forty-two trials met the inclusion criteria. They were of nursing interventions for smoking cessation for adults who used tobacco (primarily cigarettes), published between 1987 and 2007. One trial (Sanders 1989a; Sanders 1989b) had two parts with randomization at each stage, so is treated here as two separate studies, making a total of 43 studies in the Table of Included Studies. Thirty studies contributed to the primary meta-analysis that compared a nursing intervention to a usual care or minimal intervention control. Nine studies included a comparison between two nursing interventions, involving different components or different numbers of contacts. Four studies did not contribute to a meta-analysis and their results are described separately. Sample sizes of studies contributing to a meta-analysis ranged from 25 to 2700 but were typically between 150 and 500.

Sixteen trials took place in the USA, nine in the UK, three in Canada, two each in Australia, Denmark, Japan, The Netherlands, Norway and Spain, and one trial each was reported from South Korea and from Sweden.

Seventeen trials intervened with hospitalized patients (Taylor 1990; Rigotti 1994; DeBusk 1994; Allen 1996; Carlsson 1997; Miller 1997; Lewis 1998; Feeney 2001; Bolman 2002; Hajek 2002, Quist-Paulsen 2003; Froelicher 2004; Hasuo 2004; Chouinard 2005; Hennrikus 2005; Nagle 2005; Hanssen 2007). One trial (Rice 1994) recruited hospitalized patients, but with follow up after discharge. Nineteen studies recruited from primary care or outpatient clinics (Janz 1987; Sanders 1989a/Sanders 1989b; Risser 1990; Vetter 1990; Nebot 1992; Hollis 1993; OXCHECK 1994; Family Heart 1994; Tonnesen 1996; Campbell 1998; Lancaster 1999; Steptoe 1999; Canga 2000; Aveyard 2003; Ratner 2004; Tonnesen 2006; Kim 2005; Hilberink 2005; Sanz-Pozo 2006). In some trials, the recruitment took place during a clinic visit whilst in others the invitation to enrol was made by letter. One study (Terazawa 2001) recruited employees during a workplace health check, two enrolled community-based adults motivated to make a quit attempt (Davies 1992; Alterman 2001), one recruited mothers taking their child to a paediatric clinic (Curry 2003) and one recruited people being visited by a home healthcare nurse (Borrelli 2005).

Twelve of the studies focused on adults with diagnosed cardiovascular health problems (Taylor 1990; DeBusk 1994; Family Heart 1994; Rice 1994; Rigotti 1994; Allen 1996; Carlsson 1997; Miller 1997 (subgroup with cardiovascular disease); Campbell 1998; Feeney 2001; Bolman 2002; Hajek 2002); two studies were with patients with respiratory diseases (Tonnesen 1996; Tonnesen 2006) and one with patients with diabetes (Canga 2000). One study recruited people attending a surgical pre-admission clinic (Ratner 2004).

All studies included adults 18 years and older who used some form of tobacco. Allen 1996, Curry 2003 and Froelicher 2004 studied females only, and Terazawa 2001 males only. The definition of tobacco use varied and in some cases included recent quitters.

Five of the studies examined a smoking cessation intervention as a component of multiple risk factor reduction interventions in adults with cardiovascular disease (DeBusk 1994; Allen 1996; Carlsson 1997; Campbell 1998; Hanssen 2007). In the first three of these studies, the smoking cessation component was clearly defined, of high intensity, and independently measurable. In the fourth and fifth studies the smoking component was less clearly specified.

Thirty-one studies with a total of over 15,000 participants contributed to the main comparison of nursing intervention versus control. We classified 24 as high intensity on the basis of the planned intervention, although in some cases implementation may have been incomplete. In seven, we classified the intervention as low intensity (Janz 1987; Vetter 1990; Davies 1992; Nebot 1992; Tonnesen 1996; Aveyard 2003; Nagle 2005). All of these were conducted in outpatient, primary care or community settings. One further study (Hajek 2002) may be considered as a comparison between a low intensity intervention and usual care. Patients in

the usual care control group received systematic brief advice and self-help materials from the same nurses who provided the intervention. Unlike the other trials in the low intensity subgroup, this trial was conducted amongst inpatients with cardiovascular disease. Since the control group received a form of nursing intervention, we primarily classified the trial as a comparison of two intensities of nursing intervention. But since other studies had usual care groups that may have received advice from other healthcare professionals, we also report the sensitivity of the main analysis results to including it there as a low intensity nursing intervention compared to usual care control.

Hajek 2002 and eight other studies contributed to a second group comparing two interventions involving a nursing intervention. Three of these tested additional components as part of a session; demonstration of carbon monoxide (CO) levels to increase motivation to quit (Sanders 1989b); CO and spirometry feedback (Risser 1990); CO feedback, additional materials and an offer to find a support buddy (Hajek 2002). Three involved additional counselling sessions from a nurse (Alterman 2001; Feeney 2001; Tonnesen 2006). One other study compared two interventions with a usual care control (Miller 1997). The minimal intervention condition included a counselling session and one telephone call after discharge from hospital. In the intensive condition, participants received three additional telephone calls, and those who relapsed were offered further face-to-face meetings, and nicotine replacement therapy if needed. We classified both interventions as intensive in the main meta-analysis, but compared the intensive and minimal conditions in a separate analysis of the effect of additional follow up. Chouinard 2005 also assessed the effect of additional telephone support as an adjunct to an inpatient counselling session, so is pooled in a subgroup with Miller 1997. We included in the same subgroup a study that tested additional telephone follow up as a relapse prevention intervention for people who had inpatient counselling (Hasuo 2004).

Four studies (Family Heart 1994; OXCHECK 1994; Campbell 1998; Steptoe 1999) were not included in any meta-analysis and do not have results displayed graphically because their designs did not allow appropriate outcome data to be extracted. The first part of a two-stage intervention study is also included here (Sanders 1989a); the second part (Sanders 1989b) is included in one of the meta-analyses. These five studies are discussed separately in the results.

We determined whether the nurses delivering the intervention were providing it alongside clinical duties that were not smoking-related, were working in health promotion roles, or were employed specifically as project nurses. Of the high intensity intervention studies, seven used nurses for whom the intervention was a core component of their role (Hollis 1993; DeBusk 1994; Allen 1996; Carlsson 1997; Terazawa 2001; Quist-Paulsen 2003; Froelicher 2004). In eight studies the intervention was delivered by a nurse specifically employed by the project (Taylor 1990; Rice 1994; Rigotti 1994; Miller 1997; Lewis 1998; Canga 2000; Hennrikus 2005; Hanssen 2007). In three of these, the same nurse provided all the interventions (Rigotti 1994; Lewis 1998; Canga 2000). One study (Kim 2005) employed retired nurses who were trained to provide brief intervention using the '5 As' framework. In only four studies were intensive interventions intended to be delivered by nurses for whom it was not a core task (Lancaster 1999; Bolman 2002; Curry 2003; Sanz-Pozo 2006). Most of the low intensity interventions were delivered by primary care or outpatient clinic nurses. One low intensity inpatient intervention was delivered by a clinical nurse specialist (Nagle 2005).

A brief description of the main components of each intervention is provided in the 'Characteristics of Included Studies' table.

Follow-up periods for reinforcement and outcome measurements varied across studies, with a tendency for limited reinforcement and shorter follow-up periods in the older studies. All trials had some contact with participants in the first three months of follow up for restatement of the intervention and/or point prevalence data collection. Five of the studies had less than one year final outcome data collection (Janz 1987; Vetter 1990; Davies 1992; Lewis 1998; Canga 2000). The rest had follow up at one year or beyond. Outcome used for the meta-analysis was the longest follow up (six months and beyond). There was no evidence from a subgroup analysis that the differences in length of follow up explained any of the heterogeneity in study results.

Risk of bias in included studies

Of the 31 studies contributing to the primary meta-analysis, we graded 15 (48%) as A for reporting a randomization and allocation concealment process likely to avoid selection bias. The majority employed some form of computer-generated allocation system. Six studies (20%) were classified as potentially inadequate (graded C). In one of these studies the last two digits on the patient record was used for assignment (Hollis 1993), and in a second study participants drew a coloured ball from a bag (Curry 2003). Four studies allocated interventions by provider rather than by individual participant: by clinic session (Janz 1987); by intervention teams (Nebot 1992); by primary care clinic (Hilberink 2005) and by hospital (Bolman 2002). In Hilberink 2005 some clinics dropped out after randomization due to problems identifying and recruiting participants. This raised the possibility of selection bias, and it was noted that the distribution of participants' stage of change differed between in the intervention and control groups. In Bolman 2002, four of eleven hospitals selected their condition, although seven were randomly allocated. There were also baseline differences among smokers, and although raw data suggested a benefit for the intervention, a logistic regression analysis did not detect a significant effect. In order to include this study in the meta-analysis we adjusted the number of quitters in the intervention group to match the odds ratio derived from the logistic regression. Excluding the study completely did not change the pooled effect. The remaining ten studies (40%) did not specify exactly how random

assignment and allocation concealment were achieved (graded B). A sensitivity analysis including only the results of studies graded A did not alter the main conclusions. Of the five studies not used in any meta-analysis one was adequate (Campbell 1998), three were unclear (Family Heart 1994; OXCHECK 1994; Steptoe 1999), and one was inadequate (Sanders 1989a).

Definitions of abstinence ranged from single point prevalence to sustained abstinence (multiple point prevalence with self report of no slips or relapses). In one study (Miller 1997) we used validated abstinence at one year rather than continuous self-reported abstinence because only the former outcome was reported for disease diagnosis subgroups. Validation of smoking behaviour using biochemical analysis of body fluids (e.g. cotinine or thiocyanate) was reported in 15 (47%) of the thirty-one studies in the primary meta-analysis. Expired carbon monoxide (CO) was used for validation in another six (24%) of the trials. One study tested CO levels only amongst people followed up in person (Curry 2003). Five others used some validation but did not report rates based on biochemical validation of every self-reported quitter (Nebot 1992; Miller 1997; Froelicher 2004; Borrelli 2005; Rice 1994). Six studies (23%) did not use any biochemical validation and relied on self-reported smoking cessation at a single follow up (Janz 1987; Allen 1996; Carlsson 1997; Bolman 2002; Hilberink 2005; Hanssen 2007) though two of these warned participants that samples might be requested for testing (i.e., 'bogus pipeline'). Where both self-reported and validated quitting were reported, the level of misreporting or failure to provide a sample is typically similar across intervention and control groups. One recent study, however, reported differential validation failure rates so that the significant differences based on self report were not found for validated abstinence (Hennrikus 2005).

Almost all the trials used convenience rather than randomly selected samples. Only one of the studies (Vetter 1990) did not let participants know initially that they were going to be part of a smoking cessation study. In most of the research, the basis for sample size was not specified *a priori,* nor was a retrospective power analysis conducted. Most studies did not report 'refusal to participate' rates. Although a few studies did not report drop-out rates, most tried to account for all participants in their sample and treated 'non-reporters' as continuing smokers. Drop-out rates, both before and after informed consent, varied considerably across studies. In one study 79% of usual care participants were not followed up (Feeney 2001).

Effects of interventions

Effects of intervention versus control/usual care

Smokers offered advice by a nursing professional had an increased likelihood of quitting compared to smokers without intervention, but there was evidence of moderate statistical heterogeneity between the results of the 31 studies contributing to this comparison (I^2=54%). Heterogeneity was more apparent in the subgroup of 24 high intensity trials (I^2=59%). There was one trial with a significant negative effect for treatment (Rice 1994) and two with particularly large positive effects (Canga 2000; Terazawa 2001). Pooling all 31 studies using a fixed-effect method gave a risk ratio (RR) of 1.28 with 95% confidence interval (CI) 1.18 to 1.38 at the longest follow up (*Comparison 01*). Because of the heterogeneity we tested the sensitivity to pooling the studies using a random-effects model. This did not materially alter the estimated effect size or significance (random-effects RR 1.31, 95% CI 1.14 to 1.50). Excluding the three outlying trials marginally lowered the fixed-effect estimate (RR 1.27 95% CI 1.18 to 1.38) and almost removed the heterogeneity not attributable to chance (I^2=17%).

We also tested the sensitivity of these results to excluding studies that did not validate all reports of abstinence, limiting the analysis to studies graded A for quality of allocation concealment, and excluding studies with less than 12 months follow up. None of these altered the estimates to any great extent, although confidence intervals became wider due to the smaller number of studies. Excluding one study (Bolman 2002) for which we were not able to enter the numbers of quitters directly did not alter the results.

Some participants in Taylor 1990 had been encouraged to use nicotine replacement therapy (NRT). Exclusion of these people did not alter the significant effect of the intervention in this study. In Miller 1997 more people in the intervention conditions than the control used NRT (44% of intensive and 39% of minimal intervention versus 29% of control). People who were prescribed NRT had lower quit rates than those who were not, but the relative differences in quit rates between the usual care and intervention groups were similar for the subgroups that did and did not use NRT. However, because of the different rates of use of NRT, it is probable that the increased use of NRT contributed to the effects of the nursing intervention. Use of NRT was also encouraged as part of the Canga 2000 intervention, with 17% of the intervention group accepting a prescription.

Effect of intervention intensity

We detected no evidence from our indirect comparison between subgroups that the trials we classified as using higher intensity interventions had larger treatment effects. In this update of the review the point estimate for the pooled effect of the seven lower intensity trials is effectively the same as for the 24 of higher intensity, The difference between this update and previous versions of the review is that the confidence interval for the low intensity trials no longer excludes 1. (High intensity subgroup RR 1.28, 95% CI 1.18 to 1.39. Low intensity subgroup RR 1.27, 95% CI 0.99 to 1.62). In the previous version we had found that the significance in the low intensity subgroup was lost when we included Hajek 2002, a study for which we were uncertain over the classification of the control group (as noted above in the *Description of studies* section). As before, including this study in the low intensity subgroup further reduced the point estimate and there was no evidence of a treatment effect (RR 1.09, 95% CI 0.92 to 1.29). Compared to the other trials in the low intensity subgroup, the Hajek trial

was conducted amongst hospitalized patients with cardiovascular disease and the overall quit rates were high. The large number of events gave this trial a high weight in the meta-analysis.

The distinction between low and high intensity subgroups was based on our categorization of the intended intervention. Low levels of implementation were particularly noted in the trial reports for Lancaster 1999, Bolman 2002 and Curry 2003, so we tested the effect of moving them from the high to the low intensity subgroup. This reduced the point estimate of effect in the low intensity subgroup and increased it in the high intensity one. If these three studies and Hajek 2002 are included in the low intensity subgroup, the pooled estimate of effect is small and non-significant (RR 1.09, 95% CI 0.96 to 1.25 [*Comparison 04*]). We also assessed the sensitivity of the results to using additional participants in the control group for Aveyard 2003 (see notes in Included Study Table for details). This reduced the size of the effect in the low intensity subgroup but did not alter our conclusions.

Effects of differing health states and client settings

Trials in hospitals recruited patients with health problems, but some trials specifically recruited patients with cardiovascular disease, and amongst these, some interventions addressed multiple risks whilst most only addressed smoking. Trials in primary care generally did not select patients with a particular health problem. We combined setting and disease diagnosis in one set of subgroups (*Comparison 02*).

Four trials that included a smoking cessation intervention from a nurse as part of cardiac rehabilitation showed a significant pooled effect on smoking (RR 1.39, 95% CI 1.17 to 1.65). Three of these (Allen 1996; Carlsson 1997; Hanssen 2007) did not use biochemical validation of quitting, and in the fourth (DeBusk 1994) we were unable to confirm the proportion of drop-outs with the study authors.

There was moderate heterogeneity (I^2 = 50%) amongst seven trials in hospitalized smokers with cardiovascular disease, due to the strong intervention effect in one of the seven trials (Taylor 1990). The estimated RR was 1.29 (95% CI 1.14 to 1.45) and the effect remained significant if Taylor 1990 was excluded or if a random-effects model was used. A sensitivity analysis of the effect of including Hajek 2002 in this category increased the heterogeneity (I^2 = 60%), and the pooled effect was just significant whether a fixed-effect or a random-effects model was used (*Comparison 05*). Excluding Taylor 1990 again removed heterogeneity but the pooled effect was then small and not significant (RR 1.1, 95% CI 0.99 to 1.26, P=0.23, figure not shown).

Amongst the five trials in non-cardiac hospitalized smokers the risk ratio was small and the confidence interval did not exclude no effect (RR 1.04, 95% CI 0.89 to 1.22). We included in this subgroup one trial that began the intervention in a pre-admission clinic for elective surgery patients (Ratner 2004). There was no evidence for an effect of an intervention in one trial (Rice 1994) amongst non-hospitalized adults with cardiovascular disease (RR 0.35, 95% CI 0.13 to 0.55). Subgroup analysis in that study, however, suggested that smokers who had experienced cardiovascular bypass surgery were more likely to quit, and these patients were over-represented in the control group who received advice to quit but no structured intervention.

Pooling 14 trials of cessation interventions for other non-hospitalized adults showed an increase in the success rates (RR 1.84, 95% CI 1.49 to 2.28). A sensitivity analysis testing the effect of excluding those trials (Janz 1987; Vetter 1990; Curry 2003; Hilberink 2005) where a combination of a nursing intervention and advice from a physician was used did not substantially alter this.

Higher versus lower intensity interventions

Effects of physiological feedback

Two trials (Sanders 1989b; Risser 1990) that evaluated the effect of physiological feedback as an adjunct to a nursing intervention failed to detect an effect at maximum follow up (*Comparison 03.01*).

Effects of other components at a single contact

One trial in hospitalized smokers with cardiovascular disease (Hajek 2002) failed to detect a significant benefit of additional support from a nurse giving additional written materials, a written quiz, an offer of a support buddy, and carbon monoxide measurement compared to controls receiving brief advice and a self-help booklet (RR 0.91, 95% CI 0.73 to 1.13) (*Comparison 03.01*)

Effects of additional telephone support

There was weak evidence from pooling three trials that additional telephone support increased cessation, since the lower limit of the confidence interval was at the boundary of no effect, (RR 1.25, 95% CI 1.00 to 1.56; *Comparison 03.02*).

Effects of additional face to face sessions

One trial of additional support from an alcohol and drug assessment unit nurse for patients admitted to a coronary care unit (Feeney 2001) showed a very significant benefit for the intervention. The cessation rate among the controls, however, was very low (1/97), and there were a large number of drop-outs, particularly from the control group. This could have underestimated the control group quit rate. In another trial (Alterman 2001), offering four nurse sessions rather than one as an adjunct to nicotine patch showed no benefit, with the control group having a significantly higher quit rate (OR 0.36, 95% CI 0.15 to 0.85). No explanation was offered for the lower than expected quit rates in the intervention group. One trial of providing additional clinic sessions and telephone support to people receiving either nicotine sublingual tablets or placebo (Tonnesen 2006) had almost identical quit rates in the high and low intensity arms (all in *Comparison 03.02*).

Results of studies not included in the meta-analysis

We identified five studies (Sanders 1989a; Family Heart 1994; OXCHECK 1994; Campbell 1998; Steptoe 1999) in which nurses intervened with primary care patients. All except Sanders 1989a addressed multiple cardiovascular risk factors, and all except Campbell 1998 targeted healthy patients. The latter recruited patients with coronary heart disease. Although they met the main inclusion criteria, in four of the trials the design did not allow for

data extraction for meta-analysis in a comparable format to other studies. In the other (Sanders 1989a) only a random sample of the control group was followed up. We therefore discuss these trials separately.

Sanders 1989a, in which smokers visiting their family doctor were asked to make an appointment for cardiovascular health screening, reported that only 25.9% of the patients made and kept such an appointment. The percentage that had quit at one month and at one year and reported last smoking before the one-month follow up was higher both in the attenders (4.7%) and the non-attenders (3.3%) than in the usual care controls (0.9%). This suggests that the invitation to make an appointment for health screening could have been an anti-smoking intervention in itself, and that the additional effect of the structured nursing intervention was small. We do not have comparable data for OXCHECK 1994, which used similar health checks, because the households had been randomized to be offered the health check in different years. The authors compared the proportions of smokers in the intervention group who claimed to have stopped smoking in the previous year to patients attending for their one-year follow up, and to controls attending for their first health check. They found no difference in the proportions that reported stopping smoking in the previous year.

The Family Heart 1994 study offered nurse-led cardiovascular screening for men aged 40 to 59 and for their partners, with smoking cessation as one of the recommended lifestyle changes. Cigarette smokers were invited to attend up to three further visits. Smoking prevalence was lower amongst those who returned for the one-year follow up than amongst the control group screened at one year. This difference was reduced if non-returners were assumed to have continued to smoke, and if CO-validated quitting was used. In that case there was a reduction of only about one percentage point, with weak evidence of a true reduction.

Campbell 1998 invited patients with a diagnosis of coronary heart disease to nurse-run clinics promoting medical and lifestyle aspects of secondary prevention. There was no significant effect on smoking cessation. At one year the decline in smoking prevalence was greater in the control group than in the intervention group. Four-year follow up did not alter the effect of a lack of benefit.

Steptoe 1999 recruited patients at increased risk of coronary heart disease for a multi-component intervention. The quit rate amongst smokers followed up after one year was not significantly higher in the intervention group (9.4%, 95% CI -9.6 to 28.3), and there was greater loss to follow up of smokers in the intervention group.

DISCUSSION

The results of this meta-analysis support a modest but positive effect for smoking cessation intervention by nursing, but with caution about the effects that can be expected if interventions are very brief or cannot be consistently delivered. A structured smoking cessation intervention delivered by a nurse was more effective than usual care on smoking abstinence at six months or longer post-treatment. Whilst the direction of effect was consistent in different intensities of intervention, in different settings, and in smokers with and without tobacco-related illnesses, a subgroup of low intensity studies showed small and non-significant effects. There was also some evidence of statistical heterogeneity, although this was attributable to a very small number of outlying studies. In the one study (Rice 1994) that showed a statistically significant higher quit rate in a control group, participants had been advised to quit and the control group included a significantly larger proportion of people who had had coronary artery bypass graft surgery. A multivariate analysis of one-year follow-up data in this study revealed a quitter was significantly more likely to be less than 48 years, male, have had individualized versus group or no cessation instruction and to have had a high degree of perceived threat relative to their health state.

In this update of the review, we have changed the summary effect measure from the odds ratio to the risk ratio. An advantage of this is that it is more stable across a range of control group quit rates, and it avoids the risk that an odds ratio will be interpreted as a relative risk. Estimated effects appear smaller in this version of the review largely as a result of the change in the measure. In this update the estimated effect in the primary comparison, pooling 31 studies, is 1.3 for the risk ratio, or 1.4 as an odds ratio. In the previous update pooling 20 studies the odds ratio was 1.5, whilst in the first version of the review published in 1999 with 15 studies the odds ratio was 1.4. The effect has therefore been quite stable over time, but a small number of the most recent trial have had smaller effects. The effect of the change in outcome measure is most apparent in the subgroup of trials where control group event rates are highest, such as interventions for people in hospital with cardiovascular disease. The risk ratio estimated from pooling four studies of multifactor risk reduction interventions (*Comparison 02.01*) is 1.4, but as an odds ratio it is 2.1, almost identical to the result based on three studies in the last version of the review.

Overall, these meta-analysis findings need to be interpreted carefully in light of the methodological limitations of both the review and the clinical trials. In terms of the review, it is possible that there was a publication selection bias due to using only tabulated data derived from published works (Stewart 1993). Data from the unpublished and/or missed studies could have shown more or less favourable results. Secondly, the results of a meta-analysis (based on the findings of many small trials) should be viewed with caution even when the combined effect is statistically significant (LeLorier 1997) . In this analysis one study (Miller 1997) contributes 23% of the weight to the primary analysis, while the next largest contributes 12% of the weight. Finding statistical heterogeneity between the odds of cessation in different studies limits any assumption that interventions in any clinical setting and with any type of patient are equally effective.

A difference among the studies that may have contributed to the differences in outcome was baseline cigarette use. There was an inverse relationship between number of cigarettes smoked per day and success in quitting; the more addicted the individuals, the more difficult it was for them to quit. Studies that recruited a higher proportion of lighter smokers or that included recent quitters could have achieved better results. Interestingly, the studies in the meta-analysis that reported the highest cigarette use rates had the weakest effect for the intervention (Davies 1992; Rice 1994). Although some trials included recent quitters in their recruitment, there was no evidence that these trials had different results.

When this review was first prepared we found similar effect estimates for high and low intensity smoking cessation interventions by nurses, as was found in a review of physicians' advice (Lancaster 2004). Presumably, the more components added to the intervention the more intense the intervention; however, assessing the contribution of factors such as total contact time, number of contacts, and content of the intervention was difficult. Our distinction between high and low intensity based on the length of initial contact, and number of planned follow ups may not have accurately distinguished among the key elements that could have contributed to greater efficacy. We found that the nature of the smoking cessation interventions differed from advice alone, to more intense interventions with multiple components, and that the description of what constituted 'advice only' varied. In most trials, advice was given with an emphasis on 'stopping smoking' because of some existing health problem. To make most interventions more intense, verbal advice was supplemented with a variety of counselling messages, including benefits and barriers to cessation (e.g. Taylor 1990) and effective coping strategies (e.g. Allen 1996). Manuals and printed self-help materials were also added to many interventions along with repeated follow ups (Hollis 1993; Miller 1997). In some studies the proposed intervention was not delivered consistently to all participants. In recent updates the evidence for the benefit of a low intensity intervention has become weaker than that for a more intensive intervention, and the estimated effect is sensitive to the inclusion of one additional study (Hajek 2002) and to the classification of intensity of three studies. Almost all the intensive interventions were delivered by either dedicated project staff or nurses with a health promotion role. Most studies in which the intensive intervention was intended to be delivered by a nurse with other roles, reported problems in delivering the intervention consistently. None showed a statistically significant benefit for the intervention. No studies were found for the giving of brief opportunistic advice that were directly analogous to the low intensity interventions used in physician advice trials (Lancaster 2004).

In two studies in the low intensity category (Janz 1987; Vetter 1990), advice from a physician was also part of the intervention and this almost certainly contributed to the overall effect. The largest study in the high intensity subgroup (Miller 1997) produced only relatively modest results. This was due in part to the effect of the minimal treatment condition that had just one follow-up telephone call. If their intensive condition alone had been used in the comparison, the estimate of effect in the intensive intervention subgroup of trials might have been increased.

One study (Miller 1997) provided data on the effect of the same intervention in smokers with different types of illness and showed a greater effect in cardiovascular patients. In these individuals the intervention increased the 12-month quit rate from 24% to 31%, which just reached statistical significance. In other types of patients, the rates were increased from 18.5% to 21%, an effect that did not reach statistical significance. In this study patients were eligible if they had smoked any tobacco in the month prior to hospitalization, but were excluded if they had no intention of quitting (although they were also excluded if they wanted to quit on their own). These criteria may have contributed to the relatively high quit rates achieved. Also, a higher proportion of patients in the intensive treatment arm than in the minimal or usual care interventions were prescribed nicotine replacement therapy (NRT). However, the intervention was also effective in those not prescribed NRT. Those given NRT were heavier smokers (with higher levels of addiction) who achieved lower cessation rates than those who did not use NRT.

This suggests that nursing professionals may have an important 'window of opportunity' to intervene with patients in the hospital setting, or at least to introduce the notion of not resuming tobacco use on hospital discharge. The size of the effect may be dependent on the reason for hospitalization. The additional telephone support, with the possibility of another counselling session for people who relapsed after discharge, seemed to contribute to more favourable outcomes in the intensive intervention used by Miller and colleagues. A separate Cochrane review of the efficacy of interventions for hospitalized patients has been recently updated (Rigotti 2007), and this supports the efficacy of interventions for this patient group, but only when the interventions included post-discharge support for at least one month. It should be noted that our subgroup analysis making indirect comparisons between trials in patients with cardiovascular disease and mixed patient populations did not distinguish by intervention intensity. The subgroup differences could be due to confounding, although both subgroups included trials of higher and lower intensity interventions.

Providing additional physiological feedback in the form of spirometry and demonstrated carbon monoxide level as an adjunct to nursing intervention did not appear to have an effect. Three studies in primary care or outpatient settings used this approach (Sanders 1989b; Risser 1990; Hollis 1993). It was also used as part of the enhanced intervention in a study with hospitalized patients (Hajek 2002).

The identification of an effect for a nurse-mediated intervention in smokers who were not hospitalized is based on 14 studies. The largest study (Hollis 1993) increased the quit rate from 2% in

those who received only advice from a physician to 4% when a nurse delivered one of three additional interventions, including a video, written materials, and a follow-up telephone call. Control group quit rates were less than 10% in almost all these studies, and more typically between 4% and 8%. The relative risk in this group of studies, 1.8, was a little higher than in some subgroups, but because of the low background quit rate the proportion of patients likely to become long-term quitters as a result of a nursing intervention in these settings is likely to be small. However, because of the large number of people who could be reached by nursing, the effect would be important.

The evidence is not strong for an effect of nurse counselling about smoking cessation when it is provided as part of a health check. It may be unrealistic to expect a benefit from this type of intervention. Two studies that invited smokers to make an appointment with a nurse for counselling (Lancaster 1999; Aveyard 2003) also had relatively poor results. In both cases the uptake of the intervention was reported to be poor, with participants reluctant to schedule visits.

Combined efforts of many types of healthcare professionals are likely to be required. The US Public Health Service clinical practice guideline 'Treating Tobacco Use and Dependence' (AHRQ 2000) used logistic regression to estimate efficacy for interventions delivered by different types of providers. Their analysis did not distinguish among the non-physician medical healthcare providers, so that dentists, health counsellors, and pharmacists were included with nurses. The guideline concluded that these providers were effective (Table 15, OR 1.7, 95% CI 1.3 to 2.1). They also concluded that interventions by multiple clinician types were more effective (Table 16, OR 2.5, 95% CI 1.9 to 23.4). Although it was recognized that there could be confounding between the number of providers and the overall intensity of the intervention, the findings confirmed that a nursing intervention that reinforces or complements advice from physicians and/or other healthcare providers is likely to be an important component in helping smokers to quit.

AUTHORS' CONCLUSIONS

Implications for practice

The results of this review indicate the potential benefits of interventions given by nurses to their patients. The challenge will be to incorporate smoking cessation interventions as part of standard practice so that all patients are given an opportunity to be asked about their tobacco use and to be given advice to quit along with reinforcement and follow up. Nicotine replacement therapy has been shown to improve quit rates when used in conjunction with counselling for behavioural change and should be considered an important adjunct, but not a replacement for nursing interventions (Stead 2008). The evidence suggests that brief interventions from nurses who combine smoking cessation work with other duties are less effective than longer interventions with multiple contacts, delivered by nurses with a role in health promotion or cardiac rehabilitation.

Implications for research

Further studies of nursing interventions are warranted, with more careful consideration of sample size, participant selection, refusals, drop-outs, long-term follow up, and biochemical verification. Additionally, controlled studies are needed that carefully examine the effects of 'brief advice by nursing' as this type of professional counselling may more accurately reflect the current standard of care. Work is now required to systematize interventions so that more rigorous comparisons can be made between studies. None of the trials reviewed was a replication study; this is a very important method to strengthen the science, and should be encouraged.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Allen 1996

Methods	Country: USA (Maryland) Recruitment setting: hospital inpatients. Intervention: Prior to hospital discharge and 2 weeks post discharge Randomization: computer assignment with balanced allocation. Allocation concealed
Participants	116 female post CABG patients. 25 smokers amongst them. Smoker defined by use of cigs in 6 months before admission. Nurses provided intervention as part of their core role
Interventions	1. Multiple risk factor intervention, self efficacy programme: 3 sessions with nurse using AHA Active Partnership Program and a follow-up call 2. Usual care (standard discharge teaching and physical therapy instructions) Intensity: high
Outcomes	Abstinence at 12m ('current use') Validation: none
Notes	Data on number of quitters derived from percentages. Likely to include some who stopped prior to intervention.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Alterman 2001

Methods	Country: USA Recruitment setting: community volunteers, motivated to quit, cessation clinic Randomization: 'urn technique', no description of concealment
Participants	160 smokers (>= 1 pack/day) in relevant arms
Interventions	All received nicotine patch 21mg 8 weeks incl weaning Medium Intensity: 4 sessions over 9 weeks, 15-20 mins, advice & education from nurse practitioner Low Intensity: single 30 min session with nurse, 3 videos
Outcomes	Abstinence at 12m, not defined Validation: CO<9ppm, urine cotinine <50ng/ml
Notes	No control group so not in main analysis. High intensity intervention not included in review. Authors give 77 as ITT denominator for medium intensity group. N randomized of 80 used here.

Alterman 2001 (*Continued*)

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

Aveyard 2003

Methods	Country: UK Recruitment setting: 65 general practices, invitation by letter Randomization: questionnaire read optically, allocation by computer using minimization
Participants	831 current smokers in relevant arms, volunteers but not selected by motivation (>80% precontemplators) Intervention from practice nurses with 2 days training in Pro-Change system
Interventions	1. In addition to tailored self help in 2., asked to make appointment to see practice nurse. Single postal reminder if no response. Up to 3 visits, at time of letters. Reinforced use of manual. 2. Self-help manual based on Transtheoretical model, maximum of 3 letters generated by expert system. No face to face contact. Intensity: low (Standard S-H control and telephone counselling arms not used in review.)
Outcomes	Abstinence at 12m, self-reported sustained for 6m Validation: saliva cotinine <14.2ng/ml
Notes	Low uptake of nurse component, 20% attended 1st visit, 6% 2nd and 2% 3rd, also more withdrawals (20%). Nursing arm discontinued part way through recruitment. We use only the Manual (control) group recruited during 4 arm section of trial (3/418, data from author website www.publichealth.bham.ac.uk/berg/pdf/Addiction2003.pdf, compared to 15/683 for Manual group across the entire trial). This increases apparent benefit of nurse intervention. A sensitivity analysis did not alter any findings from the meta-analysis.

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	Adequate

Bolman 2002

Methods	Country: Netherlands Recruitment setting: cardiac ward patients in 11 hospitals Randomization: by hospital, 4/11 selected condition (exclusion of these did not change results)

Bolman 2002 (*Continued*)

Participants	789 smokers who had smoked in previous week. 25 deaths, 38 refusals, 64 missing baseline data excluded from analysis denominator. Nurses had 2 hours training and delivered intervention alongside normal duties
Interventions	1. Cardiologist advice on ward and 1st check-up, GP notified, Nurse provided stage of change-based counselling and provided a self-help cessation manual and a brochure on smoking and CHD. Nurse assessed smoking behaviour, addiction, motivation, addressed pros and cons, barriers and self-efficacy, encouraged a quit date. 2. Usual care (nurses on control wards intended to be blind to status) Intensity: High (but not consistently delivered)
Outcomes	Abstinence at 12m (no smoking since hospital discharge) Validation: none ('bogus pipeline')
Notes	Process analysis indicated some implementation failure. Due to cluster randomization there were baseline differences between intervention and control participants. Raw numbers quit are misleading. Regression analyses suggest no significant effect on continuous abstinence at 12m, so numbers quit in intervention group in meta-analysis adjusted to approximate the odds ratio & confidence interval from regression analysis

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	Inadequate

Borrelli 2005

Methods	Country: USA Recruitment/setting: Home healthcare nursing service Randomization: cluster randomized by nurse, method of allocation not described
Participants	278 smoking patients of home healthcare nurses, not selected by motivation 54% F, av.age 57, av.cpd 21 Home healthcare nurses trained to deliver intervention during usual visits
Interventions	1. Motivational enhancement. 3 x 20-30 min sessions during nursing visits. 5 min follow-up call. 2. Standard care control based on 5As model, single 5-15 min session with brief support at subsequent nursing visits, consistent with guidelines. Intensity: High
Outcomes	Abstinence at 12m (no smoking since 6m assessment) Validation: CO<10ppm obtained for 60%, informant report also used
Notes	New for 2008/1 update Nurses treated an average of 4 patients (range 1-13). Within-nurse correlation low, so multilevel models not reported.

	39 deaths & 5 who quit before intervention excluded from denominators. Included in high intensity subgroup. Control intervention was more than usual care.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Campbell 1998

Methods	Country: UK (Scotland) Recruitment setting: GP (Family Practice) Intervention: within 3m of enrolment Randomization: centrally, stratified for age, sex & practice
Participants	Approx 200 smokers amongst 1343 patients with CVD diagnosis
Interventions	1. Multiple risk factor intervention, at least one 45min counselling session plus follow-up visits 2. Usual care
Outcomes	Abstinence at 12m Validation: none
Notes	Not included in meta-analysis. Data presented as odds ratio for non-smoking

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Canga 2000

Methods	Country: USA Recruitment: 15 primary care centres, 2 hospitals Intervention: After enrolment Randomization: computer-generated sequence, sealed envelope used but not specified to be numbered & opaque.
Participants	280 smokers with diabetes (incl 16 recent quitters) Intervention delivered by a single research nurse
Interventions	1. Individual counselling based on NCI physician manual: 40 min, follow up with phone call, 2 further visits, letter. 2. Usual care Intensity: High

Canga 2000 (*Continued*)

Outcomes	Abstinence at 6m for >5m. Validation: urine cotinine
Notes	NRT offered to 105 of intervention group but only accepted by 25. No reported use in control group. Quit rate for NRT user subgroup not stated. 6 in int and 4 in control failed/refused validation

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Carlsson 1997

Methods	Country: Sweden Recruitment setting: Hospital CCU. Intervention at home 4 weeks after discharge. Randomization: method not stated
Participants	168 survivors of AMI. 67 smokers amongst them defined as present smoker by questionnaire. Intervention delivered by a trained nurse rehabilitator
Interventions	1. Multiple risk factor intervention in secondary prevention unit, 1.5 hrs smoking cessation component as part of 9 hours group/ individual counselling. 4 visits to nurse during 9m. 2. Usual care, follow up by general practitioners Intensity: High
Outcomes	Abstinence at 12m Validation: none
Notes	

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Chouinard 2005

Methods	Country: Canada Recruitment setting: Inpatients with cardiovascular disease (MI, angina, CHF) or PVD, unselected by motivation Randomization: In blocks of 3-6, sealed envelope
Participants	168 past-month smokers. Av.age 56 Intervention delivered by a research nurse

Chouinard 2005 (*Continued*)

Interventions	1. Counselling by research nurse (1x, 10-60 mins, av. 40 min, based on Transtheoretical Model, included component to enhance social support from a significant family member), 23% used pharmacotherapy. 2. As 1, plus telephone follow up, 6 calls over 2m post-discharge, 29% used pharmacotherapy 3. Control: cessation advice, 11% used pharmacotherapy.
Outcomes	Abstinence at 6m (sustained at 2m & 6m) Validation: Urine cotinine or CO
Notes	New for 2008/1 update Two interventions combined versus control in high intensity subgroup. 1 versus 2 used in higher versus lower comparison. Four deaths (3 in Grp 1., 1 in Grp 2.) and 3 not meeting follow-up criteria excluded from MA denominators. Other losses to follow up included.

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	Adequate

Curry 2003

Methods	Country: USA Recruitment setting: mothers attending 4 paediatric clinics, unselected by motivation Randomization: selection of coloured ping-pong ball
Participants	303 women (any smoking), 23% in precontemplation av age 33, av cpd 12 Intervention delivered either by clinic nurses or a study interventionist. Nurses received 8 hours individual training in motivational interviewing
Interventions	1. Clinician advice based on 5A's (1-5mins), Self-help materials targeted for mothers. Asked to meet a nurse or health educator who provided motivational interviewing during visit. Up to 3 phone calls over 3m. 2. No intervention Intensity: High (but implementation incomplete)
Outcomes	Abstinence at 12m (Sustained at 3m & 12m. PP also reported) Validation: CO<10ppm, only for women followed up in person. Tabulated rates based on self report
Notes	Intervention included physician advice. Not all participants received intervention. Based on counsellor records, 74% received face-to-face intervention, average length 13 mins, and 78% had at least 1 phone call. Nurses provided intervention as part of their normal duties.

Risk of bias

Item	**Authors' judgement**	**Description**

Curry 2003 (*Continued*)

Allocation concealment?	No	Inadequate

Davies 1992

Methods	Country: Canada Recruitment setting: healthy adult community-based volunteers Randomization: method not stated. Each participating nurse visited a control patient first, then received training.
Participants	307 essentially healthy adult smokers of at least 5 cpd
Interventions	1. 'Time To Quit' programme delivered by a student nurse trained in programme 2. Visit by same student nurse prior to receiving training Intensity: Low
Outcomes	Abstinence at 9m Validation: Cotinine<100ng/ML
Notes	Effect of training and manuals on nurse intervention

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

DeBusk 1994

Methods	Country: USA (California) Recruitment setting: inpatients with AMI at 5 hospitals Randomization: centralized computer allocation. Both smokers and non-smokers randomized.
Participants	131/293 intervention and 121/292 control patients were smokers as defined by any use of tobacco in 6m before admission. Nurses provided intervention as part of their core role
Interventions	1. Multiple risk factor intervention case-management system with smoking cessation, nutritional counselling, lipid lowering therapy and exercise therapy. Smoking cessation: 2 min physician then nurse counselling with repeated telephone follow ups x8. NRT offered only to highly addicted patients who relapsed post-discharge. 2. Usual care including physician counselling. Group cessation programmes available for US$50 (2% enrolled)
Outcomes	Abstinence at 1yr (PP) Validation: plasma cotinine<10ng/mL, or 11-15 ng/mL with expired CO<10ppm.

DeBusk 1994 (*Continued*)

Notes	Number of quitters derived from smoking cessation rates based on number of baseline smokers - Author contacted for smoker drop-out rates.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Family Heart 1994

Methods	Country: UK Recruitment setting: Male general practice (family practice) patients aged 40-59 and partners, identified by household Randomization: by practice (one of a pair in each of 14 towns), and within intervention practices by individuals to screening/ intervention or 1 year screening
Participants	7460 male and 5012 female medical practice patients who reported 'smoking' on a questionnaire.
Interventions	1. Screening for cardiovascular risk factors, risk-related lifestyle intervention during a single 1.5 hr visit. 2. Delayed screening (at 1 year) for families in the same practice (internal control) and the paired practice (external control)
Outcomes	Smoking prevalence at 1yr Validation: CO
Notes	Not included in meta-analysis because outcome not directly comparable with cessation studies. Smoking prevalence was lower in the intervention subjects at 1yr than in either internal or external practice controls. But non-returners in the intervention group had a higher smoking prevalence at baseline than returners.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Feeney 2001

Methods	Country: Australia Recruitment/setting: CCU, single hospital Randomization: numbered sealed envelopes (but admin error led to more in control)
Participants	198 smokers in previous week, unselected for motivation. 9 deaths (4/5) excluded from denominator in analysis

Feeney 2001 (*Continued*)

Interventions	1. Stanford Heart Attack Staying Free programme. Review by Alcohol & Drug Assessment Unit (ADAU) physician. Self-help manual, high relapse risk patients counselled on coping strategies, audiotapes. On discharge ADAU nurse contacted weekly for 4 weeks & 2,3,12m. 2. Verbal and written didactic advice, video, review by ADAU nurse, supportive counselling and follow-up offered at 3,6,12m
Outcomes	Abstinence at 12m, continuous and validated at 1m & 3m. Validation: urine cotinine<400ng/ml at each ADAU clinic visit
Notes	Both intervention and control included a nursing component so not in main analysis. Only participants who attended basic ADAU follow-up programme assessed, so large number of drop-outs. More drop-outs in group 2 (79%) than group 1 (51%), so treating drop-outs as smokers may overestimate treatment effect.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Froelicher 2004

Methods	Country: USA Recruitment/setting: Inpatients with CVD or PVD admitted to 10 hospitals Randomization: permuted blocks stratified by hospital
Participants	277 female current smokers or recent quitters (smoked in month before admission), willing to make serious quit attempt at discharge. Av. age 61, av.cpd 18-19 Intervention delivered by trained research nurses
Interventions	1. As usual care + nurse-managed cessation & relapse prevention: 30-45 min individual counselling pre-discharge with multimedia materials. Up to 5 phone calls (5-10 min) at 2, 7, 21, 28, 90 days. Relapsers offered additional session. 2. Usual care; brief physician counselling, Self-help pamphlet, list of resources Patch or gum offered to selected women after discharge who had relapsed and wanted to try to quit (pharmacotherapy used by 20% of intervention and 23% of control group). Intensity: High
Outcomes	Abstinence at 12m (7-day PP). (Also followed at 24m, 30m but validation not attempted) Validation: Saliva cotinine<14 ng/ml or family/friend verification
Notes	New for 2008/1 update 11 deaths at 12m, excluded from cessation denominators. 73% of participants reached at all 4 follow-ups

Risk of bias

Froelicher 2004 (*Continued*)

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Hajek 2002

Methods	Country: UK Recruitment/setting: inpatients with MI or for CABG at 17 hospitals Randomization: serially numbered opaque sealed envelopes
Participants	540 smokers or recent quitters (26%) who had not smoked in hospital & motivated to quit. 26 deaths, 9 moved address excluded from denominator in analysis Intervention delivered by nurses alongside other duties
Interventions	1. As control, + CO reading, booklet on smoking & cardiac recovery, written quiz, offer to find support buddy, commitment, reminder in notes. Implemented by cardiac nurses during routine work, est time 20mins. 2. Verbal advice, Smoking and Your Heart booklet
Outcomes	Abstinence at 12m, sustained (no more than 5 cigs since enrolment & 7day PP) Validation: saliva cotinine<20ng/ml (CO used at 6 week follow-up and for visits at 12m)
Notes	Control meets criteria for a low intensity intervention so not included in comparison 1, but included there and in inpatient CVDcategory in sensitivity analyses (Comparisons 4 & 5).

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Hanssen 2007

Methods	Country: Norway Recruitment/setting: inpatients with AMI Randomization: Computer-generated list, sequence in sealed opaque envelopes but not stated to be numbered. Fewer control group participants raises possibility of selection bias so not classified as A
Participants	133 daily smokers amongst 288 participants. Not selected by motivation. Demographics not given for smoking subgroup Intervention delivered by research nurses
Interventions	1. Structured but individualized telephone support addressing lifestyle issues including smoking, diet and exercise. Nurse-initiated calls at 1,2,3,4,6,8,12, 24 weeks post-discharge. Smoking not explicitly addressed at each call. Reactive phone support line available 6 hrs/week 2. Usual care; outpatient visit at 6-8 weeks and primary care follow-up

Hanssen 2007 (*Continued*)

	Intensity: High
Outcomes	Abstinence at 6m (not defined). Primary trial outcome was health-related quality of life Validation: none
Notes	New for 2008/1 Smoking was part of a multicomponent intervention.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Hasuo 2004

Methods	Country: Japan Recruitment: Inpatients (all diagnoses) Randomization: By hospital clerk using computer programme; stratified by smoking status, FTND, and self efficacy
Participants	120 current smokers or recent quitters (smoked in past month) who intended to be quit on day of discharge Diagnoses include cancer (n=37), cardiac (n=57)
Interventions	1. Intervention: nurse counselling (3 x 20 min sessions). Telephone follow up with focus on relapse prevention at 7, 21, 42 days (5 min/call) 2. Control: Same inpatient counselling but no follow-up contact
Outcomes	Abstinence at 12m (not defined). Validation: urinary cotinine
Notes	New for 2008/1 Both groups included inpatient counselling so not used in main comparison; effect of telephone follow-up. Intervention was intended to prevent relapse. MA denominators exclude 6 deaths, but include 8 who were still smoking on day of discharge. This gives marginally larger relative effect.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Hennrikus 2005

Methods	Country: USA Recruitment/setting: Inpatients (all diagnoses) admitted to 4 hospitals Selected: Invited to participate. Randomization: by research assistant from a list of randomly ordered assignments, but blinding at time of enrolment not specified
Participants	2095 current smokers (smoked in past week and considered self to be regular smoker for at least a month in past year) Not selected by motivation; approx 10% in each group confident they could quit. Av.age 47 Intervention delivered by research nurses
Interventions	1. Brief advice: as control, plus labels in records to prompt advice from nurses and physicians. 2. Brief advice and counselling: As 1. plus 1 bedside (or phone) session using motivational interviewing and relapse prevention approaches and 3 to 6 calls (2-3 days, 1 wk, 2-3 wk, 1m, 6m) 3. Control: modified usual care: smoking cessation booklet in hospital (not used in meta-analysis) Intensity: High Pharmacotherapy not offered.
Outcomes	Abstinence at 12m (7-day PP). Validation: saliva cotinine<15 ng/ml
Notes	New for 2008/1 update Brief advice & counselling regarded as nurse intervention, compared to Brief advice. Including Usual Care in control as well would marginally increase Relative Risk but not change conclusion of no effect. High and differential levels of refusal to provide validation and of misreporting 78 deaths and ineligible for follow up excluded from denominators

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Hilberink 2005

Methods	Country: Netherlands Recruitment/setting: Patients with COPD identified by prescription & diagnosis codes in 43 general practices Randomization: cluster randomized by practice. 5/48 dropped out after randomization, leading to an imbalance of numbers of participants
Participants	392 current smokers with COPD. Not selected for motivation, ~50% willing to quit within 6m, different between groups 50% F, av.age 59 Parts of intervention delivered by practice nurses alongside other duties

Hilberink 2005 (*Continued*)

Interventions	1. SMOCC intervention: booklet for COPD population & video. Stage-based intervention: Precontemplators given information on advantages of quitting. Contemplators received self efficacy enhancing intervention, discussion of barriers, info on NRT if dependent & further visit at 2 weeks. Preparers had visit to GP to schedule quit date & max 2 follow ups, & max 3 phone calls from practice nurse/assistant. 2. Usual care Intensity: High
Outcomes	Abstinence at 6m (PP) Validation: none (people told their reports would be validated)
Notes	New for 2008/1 update Only the telephone follow up for people in preparation stage was explicitly provided by a nurse. Paper notes that practices differed in amount of tasks delegated to practice nurses. Paper reports use of multilevel modelling. No adjustment to crude Relative Risk need for clustering. Denominators exclude 2 deaths and those for whom follow up not attempted

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	Inadequate

Hollis 1993

Methods	Country: USA (Portland, OR) Recruitment: Internal medicine/family clinics Randomization: By 2 random digits in health record number. Physicians blind to assignment.
Participants	2691 internal medicine/family clinic adults who reported being a smoker on a questionnaire.
Interventions	1. Brief physician advice (30 sec and pamphlet from nurse) 2. Brief physician message plus nurse who promoted self quit attempts - advice, CO feedback, 10 min video & manual (1 of 3 types) + follow-up call & materials 3. Brief physician advice plus nurse-promoted group programme - advice, CO, + video-ask to join group with schedule, coupon, etc., follow-up calls 4. Brief physician advice, and nurse-offered choice between self-directed and group-assisted quit - shown both types of materials. Intensity: High
Outcomes	Abstinence at 1yr (2 PP) Validation: Saliva cotinine at 12m
Notes	All three nurse-mediated interventions compared with 1. Saliva samples only obtained for approx half of reported quitters. Compliance and confirmation rates did not differ between groups.

Risk of bias

Hollis 1993 (*Continued*)

Item	Authors' judgement	Description
Allocation concealment?	No	Inadequate

Janz 1987

Methods	Country: USA (Michigan) Recruitment setting: OP Dept Med Clinic (R.A.) Randomization: Half-day clinics assigned to treatment status.
Participants	Smokers (>= 5 cpd) attending clinics
Interventions	1. Physician discussed personal susceptibility, self efficacy & concern, trained nurse counselled on problems and strategies. 2. As 1, and self-help manual 'Step-by-Step Quit Kit'. + 1 telephone call 3. Usual Care control (from physicians not involved in study) Intensity: Low
Outcomes	Abstinence at 6m (self-report by telephone) Validation: none
Notes	1 & 2 vs 3. Interventions included both physician and nurse components. Data derived from graphs of percentages. Original data sought but not available.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	Inadequate

Kim 2005

Methods	Country: South Korea Recruitment/setting: Internal medicine outpatient department Randomization: 12 allocation strata. Assignments in sealed opaque envelopes.
Participants	401 daily smokers, 65% willing to quit within 1m 92% M, av.age 52
Interventions	Test of 5As approach recommended by US AHCPR guideline. All participants Asked about smoking status & Advised to quit by physicians. Counsellors (retired nurses trained in cessation) Assessed willingness to quit, and enrolled & randomized patients. 1. Intervention: Counsellors provided Assist and Arrange components to participants willing to quit within 1m; set quit date, provided Self-help materials, supplied cigarette substitute. Culturally specific for Koreans. Other participants given 4Rs 2. Control: Counsellors told participants to quit without further assistance.

Kim 2005 (*Continued*)

Outcomes	Abstinence at 5m Validation: CO<=7ppm
Notes	New for 2008/1 update Marginal to include because 5m follow up and counsellors were retired nurses

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Lancaster 1999

Methods	Country: UK Recruitment setting: General practice, recruitment during a visit or by letter. Smokers who completed a questionnaire about smoking habits. Randomization: computer-generated allocation in sealed envelopes
Participants	497 smokers (av. cpd 17)
Interventions	1. Physician advice (face-to-face or in a letter) and a leaflet 2. As 1, plus invitation to contact a trained practice nurse for more intensive tailored counselling. Up to 5 follow-up visits offered.
Outcomes	Abstinence at 12m (sustained at 3m & 12m) Validation: saliva cotinine at 3m & 12m
Notes	2 vs 1. Only 30% took up offer of extended counselling. Included in high intensity subgroup based on intended intervention but sensitivity analysis for effect of treating as low intensity

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Lewis 1998

Methods	Country: USA Recruitment setting: hospital inpatients (excluding some cardiac conditions) Randomization: predetermined computer-generated code
Participants	185 hospitalized adults; self-reported 'regular use' for at least one year. Counselling intervention delivered by research nurse

Lewis 1998 (*Continued*)

Interventions	1. Minimal care (MC): motivational message from physician to quit plus pamphlet 2. Counselling and nicotine patch (CAP). 3. Counselling and placebo patch (CPP). In addition groups 2 & 3 received a motivational message & instructions on patch use from physician, 4 sessions of telephone counselling by nurse based on cognitive behavioural therapy and motivational interviewing. Intensity: high
Outcomes	Abstinence at 6m (7 day PP) Validation: CO<=10ppm
Notes	Compared 3 vs 1; Nurse counselling and placebo patch compared to minimal care to avoid confounding with effect of NRT.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Miller 1997

Methods	Country: USA (California) Recruitment setting: hospital inpatients Randomization: sealed envelopes
Participants	1942 hospitalized smokers (any tobacco use in week prior to admission) Counselling delivered by a research nurse
Interventions	1. Intensive: 30min inpatient counselling, video, workbook, relaxation tape + 4 phone calls after discharge 2. Minimal: 30min counselling etc + 1 phone call 3. Usual Care Intensity: High
Outcomes	Abstinence at 12m, (PP, sustained abstinence also reported, but not by disease subgroup) Validation: plasma cotinine or family member collaboration at 12m
Notes	1+2 vs 3 in main analysis - classifying both interventions as high intensity. Cardiovascular and other diagnoses separated in analysis by setting. 1 vs 2 in analysis of effect of additional telephone contact (sustained abstinence).

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Nagle 2005

Methods	Country: Australia Recruitment/setting: Inpatients (all diagnoses) admitted to 1 teaching hospital (excluding intensive care units), invited to participate. Randomization: stratified by smoking status in past month, blocks of 20, using handheld computer with random number programme
Participants	1422 current smokers or quitters (including 331 who had quit in past 12m). Not selected by motivation. 40% male in intervention group, 33% male in controls Main part of intervention delivered by specialist
Interventions	1. Assessment and identification of smokers with the Smoking Cessation Clinical Pathway as chart reminder for ward nurses, Clinical Nurse Specialist provided 2 brief counselling sessions, offer of NRT, (3% provided) discharge letter. 2. Usual care & assessment of smoking status, no standardized clinical assessment. Intensity: Low (borderline)
Outcomes	Abstinence at 12m (7-day validated PP, continuous self-reported abstinence also given) Validation: Saliva cotinine<=15 ng/ml.
Notes	New for 2008/1 update Study includes recent quitters; no difference in intervention effect. 85% of recent smokers received at least 1 counselling session, 38% received 2. 28 deaths at 12m excluded from denominator

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	Adequate

Nebot 1992

Methods	Country: Spain Recruitment: Primary Care Centre (patients not selected for motivation to quit) Randomization: Primary care teams randomized to perform 3 interventions in successive weeks
Participants	425 smokers (at least 1 cpd in past week)
Interventions	1. Physician advice 2. Physician advice & nicotine gum 3. Nurse counselling (up to 15 mins) Intensity: Low All received booklet and offer of follow-up visit or call.
Outcomes	Abstinence at 12m (sustained at 2m & 12m) Validation: 1/4 validated by expired CO at 2m.
Notes	3 vs 1

Nebot 1992 (*Continued*)

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	No	Inadequate

OXCHECK 1994

Methods	Country: UK Recruitment: patients aged 35-64 in 5 urban general practices (family practice) who returned a baseline questionnaire Randomization: by household, to health checks in one of 4 years
Participants	11,090 general practice patients
Interventions	1. Health check and risk factor counselling 2. Delayed intervention
Outcomes	Smoking prevalence, and reported quitting in previous year
Notes	Not included in meta-analysis because outcome not directly comparable with cessation studies. When all intervention patients (including non attenders) are compared to controls there was no significant difference in the proportion who had stopped smoking in previous year.

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

Quist-Paulsen 2003

Methods	Country: Norway Recruitment/setting: Inpatients admitted to cardiac ward of 1 general hospital, invited to participate Randomization: Serially numbered sealed envelopes
Participants	240 current smokers (smoked daily before symptoms began). Av. 15 cpd Intervention delivered by 3 cardiac nurses
Interventions	1. Intervention: Usual care plus 1-2 sessions with nurse using booklet focusing on fear arousal and relapse prevention. 5 telephone follow ups at 2, 7, 21 days, 3m, 5m). Clinic visit to nurse at 6wks. Gum or patch encouraged for subjects with strong urges to smoke in hospital. 2. Control: usual care (advice to quit + booklet) Intensity: High

Quist-Paulsen 2003 (*Continued*)

Outcomes	Abstinence at 12m (PP) Validation: urine cotinine<2.0 mmol/mol creatinine
Notes	New for 2008/1 update. Included in CVD subcategory 5 deaths and 2 people who changed address at 12m excluded from denominators.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Ratner 2004

Methods	Country: Canada Recruitment: Patients having presurgical assessment Method of randomization: sealed envelope, computer-generated assignment
Participants	237 smokers (past 7 days) awaiting elective surgery 52% female Av. 12 cpd
Interventions	1. Pre-admission clinic 15 min counselling from trained research nurse, materials, nicotine gum, quit kit, hotline number. Post-operative counselling in hospital. 9 follow-up calls over 16 wks. 2. Usual care Intensity: High
Outcomes	Abstinence at 12m (PP) Validation: urine cotinine (NicoMeter)
Notes	New for 2008/1 update 9 deaths at 12m excluded from denominators. Included in hospitalized patient subgroup for Comparison 2 although the initial intervention delivered pre-admission

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Adequate

Rice 1994

Methods	Country: USA (Michigan) Recruitment: Previously hospitalized; self-referral or by provider Randomization: table of random numbers
Participants	255 smokers (>=10 cpd) with CVD
Interventions	1. Smokeless (R) programme, individual delivery by nurse, 5 sessions 2. Same programme, 5 group sessions 3. Same programme, written self-help format 4. Usual care control Intensity: High
Outcomes	Abstinence at 12m. Validation: saliva thiocyanate measured, but self report used as outcome.
Notes	1+2+3 vs 4

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

Rigotti 1994

Methods	Country: USA (Boston) Setting/ Recruitment: Cardiac surgery unit Randomization: method not described
Participants	87 smokers (1+ pack of cigs in past 6m) scheduled for CABG.
Interventions	1. 3 sessions behavioural model with video tape and face-to-face counselling by registered nurse 2. Usual care control Intensity: High
Outcomes	Sustained abstinence at 12m Validation: saliva cotinine<20 ng/mL
Notes	Abstinence rates include some smokers who had quit prior to surgery

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

Risser 1990

Methods	Country: USA Setting: Nurse-staffed health promotion clinic Randomization: method not described
Participants	90 smokers attending health promotion clinic for annual visit
Interventions	1. 50min session, self-help materials, offer of training and counselling program. 2. as 1, plus 10min personalized motivational intervention with spirometry, CO measurement and discussion of symptoms.
Outcomes	Abstinence at 1yr (PP) Validation: expired CO
Notes	Not in main comparison: effect of additional components. No group without intervention. (No true control group.)

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Sanders 1989a

Methods	Country: UK Setting: Primary care clinics (11) Randomization: by day of week, randomized across weeks and practices.
Participants	4210 primary care clinic attenders identified by questionnaire as smokers
Interventions	1. Asked by doctor (following advice to quit) to make appointment with nurse for health check. Advice, discussion, leaflet and offer of follow up by nursing 2. Usual care control Intensity: Low
Outcomes	Sustained abstinence at 12m (self-report of not smoking at 1m and 12m and gave date on which they last smoked as before the 1m follow up) Validation: urine cotinine
Notes	Only a sample of usual care group followed up so not appropriate to use data in main meta-analysis. A significant effect of the intervention was apparent only for the sustained cessation outcome. 12m PP abstinence rates were 11.2% for intervention, 10% for control (NS).

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	Inadequate

Sanders 1989b

Methods	Country: UK Setting: Primary care clinics (11) Randomization: method not described
Participants	751 smokers who attended a health check (having been randomly allocated to an intervention offering a health check - see Sanders 1989a)
Interventions	1. Health check from a practice nurse; advice, leaflet and offer of follow up 2. As 1, with demonstration of expired CO levels.
Outcomes	Sustained abstinence at 1 yr (self report of not smoking at 1m and 12m and who gave date on which they last smoked as before the 1m follow up) Validation: urine cotinine in a sample of participants indicated a relatively high deception rate.
Notes	2 vs 1 for effect of CO demonstration as an adjunct to nurse advice. This was part of same study as Sanders 1989a, and randomized a subgroup of participants in the main study

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

Sanz-Pozo 2006

Methods	Country: Spain Setting: Primary care clinic Randomization: method not described
Participants	125 daily smokers attending clinic, motivated to make a quit attempt but not interested in using pharmacotherapy Intervention 52% F, Control 62% F, av.age ~40, av.cpd 19
Interventions	1. Brief advice from doctor at recruitment, appointment with clinic nurse 7 days before TQD, on TQD, 1wk, 1m, 2m, 3m. 2. Brief advice only. No pharmacotherapy
Outcomes	Sustained abstinence at 24m (from 12m) Validation: CO< 8ppm
Notes	New for 2008/1 Control group rates also higher at 12m follow up. Some baseline differences but logistic regression did not alter conclusion of no effect

Risk of bias

Sanz-Pozo 2006 (*Continued*)

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Steptoe 1999

Methods	Country: UK Setting: Primary care clinics (20) Randomization: cluster randomized by practice
Participants	404 smokers (from total of 883 patients with modifiable CVD risk factors)
Interventions	1. Behavioural counselling using stages of change approach. 2-3 20min sessions + 1-2 phone contacts. NRT used if appropriate. 2. Usual care
Outcomes	Sustained abstinence at 12m (4m & 12m) Validation: saliva cotinine
Notes	Not included in meta-analysis. Used practice-based analysis. Differential drop-out rates for smokers in intervention & control groups.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

Taylor 1990

Methods	Country: USA (California) Recruitment setting: Hospital (patients with AMI) Randomization: Random numbers in sealed envelopes
Participants	173 smokers following AMI. Smoker defined as any use of tobacco.
Interventions	1. Nurse counselling on self efficacy, benefits and risks, + manual coping with high risk situations. Further telephone counselling as needed up to 6m. 2. Usual care control Intensity: High
Outcomes	Abstinence at 12m Validation: serum thiocyanate<110nmol/L, expired CO<10ppm
Notes	Nurses averaged 3.5 hours/patient including phone contact Slightly higher loss to follow up in control group. Nicotine gum was prescribed to 5 patients.

Taylor 1990 (*Continued*)

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	Adequate

Terazawa 2001

Methods	Country: Japan Recruitment setting: Workplace annual health check Randomization: by employee ID number. Assigned prior to contact
Participants	228 male smokers, Av age 39, av cpd 23
Interventions	1. 15-20min stage-matched counselling by trained nurses. 4 follow-up calls for those willing to set a quit date. 1 wk after intervention, 3-4 days , 1m, 3m after cessation 2. Usual care
Outcomes	Sustained abstinence at 12m (>6m, validated at 6m & 12m) Validation: CO, urine
Notes	25 from intervention group set quit date. More intervention group in preparation/contemplation II subgroups at baseline; 17 vs 7.

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	Adequate

Tonnesen 1996

Methods	Country: Denmark Recruitment setting: outpatient chest clinic Randomization: method not described
Participants	507 smokers of <10 cpd or of >10 cpd who had refused a trial of nicotine replacement. age 20-70 yrs Intervention delivered by clinic nurses given 8hr training and 3 problem-solving meetings
Interventions	1. Motivational approach, 5 min of benefits/risks, brochures on hazards and how to quit. 4-6 wks letter sent 2. Control - questionnaire and CO measurement. No advice to stop smoking. Intensity: Low
Outcomes	Sustained abstinence at 1yr (stopped during intervention and no reported smoking during year) Validation: CO<10ppm

Tonnesen 1996 (*Continued*)

Notes		
Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

Tonnesen 2006

Methods	Country: Denmark Recruitment setting: 7 outpatient chest clinics Randomization: by block randomization list at each centre. Double blind but allocation concealment not specifically described
Participants	370 smokers of >1 cpd with COPD 52% F, av. age 61, av.cpd 20
Interventions	Factorial trial. Nicotine sublingual tablet and placebo arms collapsed in MA 1. High support: 7 x 20-30min clinic visits (0, 2, 4, 8, 12wks, 6m, 12m) & 5 x 10min phone calls (1, 6, 10wks , 4.5m. 9m), total contact time 4.5h. 2. Low support: 4 clinic visits (0, 2wks, 6m, 12m) & 6 phone calls (1, 4, 6, 9, 12wks, 9m), total time 2.5hrs
Outcomes	Sustained abstinence at 12m (validated at all visits from wk 2, PP also reported) Validation: CO<10ppm
Notes	New for 2008/1 update Not in main comparison; compares different intensities of nurse counselling

Risk of bias		
Item	**Authors' judgement**	**Description**
Allocation concealment?	Unclear	Unclear

Vetter 1990

Methods	Country: UK (Wales) Recruitment setting: general practice (family practice) Randomization: method not described
Participants	226 smokers aged 60+ in general practice who completed a health questionnaire. Unselected by motivation to quit.
Interventions	1. Letter asking patient to visit doctor who advised on importance of stopping smoking, opportunity to see practice nurse who gave advice on lifestyle factors concentrating on quitting smoking

Vetter 1990 (*Continued*)

	2. No contact, completed questionnaire only Intensity: Low
Outcomes	Abstinence at 6m (PP) Validation: expired CO (cut off point not stated)
Notes	Intervention included nursing and physician advice

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear

CABG = Coronary Artery Bypass Graft; CCU = Coronary Care Unit; CHD = coronary heart disease; CHF = congestive heart failure; CO = carbon monoxide; COPD = AHCPR = Agency for Health Care Policy and Research; Chronic Obstructive Pulmonary Disease; cpd = cigarettes per day; CVD = cardiovascular disease; FTND: Fagerstrom Test for Nicotine Dependence; ITT = intention-to-treat; m =month(s); (A)MI = (Acute) Myocardial Infarction; NRT = nicotine replacement therapy; NS: not statistically significant; PP = point prevalence; PVD = peripheral vascular disease; SMOCC = Smoking cessation for patients with COPD in general practice; TQD = target quit date

Characteristics of excluded studies *[ordered by study ID]*

Andrews 2007	Cluster-randomized trial with only 2 community clusters & baseline differences between participants. Nurse-led counselling confounded with NRT availability and personal contact from a community health worker for the duration of the trial.
Browning 2000	Not a randomized trial, uses historical control
Carlsson 1998	Describes 5 studies, only 1 reporting smoking cessation is included in review separately (Carlsson 1997).
Chan 2005	Follow up less than 6m.
Fletcher 1987	Number of quitters after 6m not stated. (Total of 20 participants)
Galvin 2001	Only 3m follow up. (Total of 42 participants)
Griebel 1998	Maximum follow up was 6 wks post-hospital discharge.
Haddock 1997	No long-term follow up. Randomization unclear.
Hall 2007	Follow up less than 6m
Jelley 1995	Not RCT. Control and intervention ran sequentially.

(*Continued*)

Johnson 1999	Not RCT. No equivalent study groups, intervention allocated according to cardiac unit of admission.
Johnson 2000	Population and intervention not within scope. Recruited women who had stopped smoking during pregnancy for a relapse prevention intervention.
Kendrick 1995	Intervention in pregnant smokers. See review by Lumley et al 2004.
Lifrak 1997	Four advice sessions with a nurse practitioner compared with a more intensive intervention of 16 weekly therapy sessions. All also received nicotine patch therapy.
McHugh 2001	Multiple risk factor intervention with shared care. Cannot evaluate effect of nursing.
O'Connor 1992	Intervention in pregnant smokers. See review by Lumley et al 2004.
Pozen 1977	Intervention in post-MI patients. Only 1m follow up, and number of smokers at baseline not described.
Reeve 2000	Follow up less than 6m.
Reid 2003	Stepped care intervention from nurse counsellor confounded with nicotine patch therapy (no evidence of effect of the combination).
Rigotti 1997	Intervention not given by a nurse.
Stanislaw 1994	Follow up less than 6m.
Sun 2000	Follow up less than 6m.
van Elderen 1994	Multicomponent intervention, smoking cessation element not clear.
Wadland 1999	Not randomized. The 2 groups were recruited by different means and given different interventions, both of which included telephone counselling by nurses or counsellors
Wadland 2001	Follow up less than 6m (90 days). Nurses and counsellors provided telephone-based intervention.
Wewers 1994	Follow up less than 6m.
Woollard 1995	No data presented on number of smokers or quitting.

DATA AND ANALYSES

Comparison 1. All nursing intervention vs control trials, grouped by intensity of intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Smoking cessation at longest follow up	31	15205	Risk Ratio (M-H, Fixed, 95% CI)	1.28 [1.18, 1.38]
1.1 High intensity intervention	24	11189	Risk Ratio (M-H, Fixed, 95% CI)	1.28 [1.18, 1.39]
1.2 Low intensity intervention	7	4016	Risk Ratio (M-H, Fixed, 95% CI)	1.27 [0.99, 1.62]

Comparison 2. All nursing intervention vs control trials, grouped by setting and population

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Smoking cessation at longest follow up	30		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 Smoking intervention as part of multifactorial intervention in patients with cardiovascular disease	4	482	Risk Ratio (M-H, Fixed, 95% CI)	1.39 [1.17, 1.65]
1.2 Smoking intervention alone in hospitalized smokers with a cardiovascular disease	7	2278	Risk Ratio (M-H, Fixed, 95% CI)	1.29 [1.14, 1.45]
1.3 Smoking intervention alone in other hospitalized smokers	5	4401	Risk Ratio (M-H, Fixed, 95% CI)	1.04 [0.89, 1.22]
1.4 Smoking intervention alone in non-hospitalized smokers with a cardiovascular disease	1	255	Risk Ratio (M-H, Fixed, 95% CI)	0.35 [0.20, 0.60]
1.5 Smoking intervention alone in other non hospitalized smokers	14	7664	Risk Ratio (M-H, Fixed, 95% CI)	1.84 [1.49, 2.28]

Comparison 3. Effect of additional strategies: Higher versus lower intensity

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Additional components at single contact. Smoking cessation at longest follow up	3		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 Demonstration of CO levels	1	751	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.55, 2.02]
1.2 Demonstration of spirometry and CO measurement	1	90	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.10, 1.15]
1.3 Additional support including CO reading, materials	1	505	Risk Ratio (M-H, Fixed, 95% CI)	0.91 [0.73, 1.13]
2 Additional contacts. Smoking cessation at longest follow up	6		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 Additional telephone support	3	1220	Risk Ratio (M-H, Fixed, 95% CI)	1.25 [1.00, 1.56]
2.2 Self-help manual, additional telephone support	1	189	Risk Ratio (M-H, Fixed, 95% CI)	32.68 [4.55, 234.56]
2.3 Three additional sessions	1	157	Risk Ratio (M-H, Fixed, 95% CI)	0.43 [0.21, 0.89]
2.4 Additional face-to-face and telephone support	1	370	Risk Ratio (M-H, Fixed, 95% CI)	1.09 [0.59, 2.04]

Comparison 4. Sensitivity analysis by intensity, including Hajek 2002, with Lancaster, Bolman, Curry as low intensity

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Smoking cessation at longest follow up	32	15710	Risk Ratio (M-H, Fixed, 95% CI)	1.24 [1.15, 1.33]
1.1 High intensity intervention	21	9654	Risk Ratio (M-H, Fixed, 95% CI)	1.31 [1.20, 1.43]
1.2 Low intensity intervention	11	6056	Risk Ratio (M-H, Fixed, 95% CI)	1.09 [0.96, 1.25]

Comparison 5. Sensitivity analysis by setting and population, including Hajek 2002

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Smoking cessation at longest follow up	9		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
1.1 Smoking intervention alone in hospitalized smokers with a cardiovascular disease	9	4127	Risk Ratio (M-H, Random, 95% CI)	1.20 [1.02, 1.42]

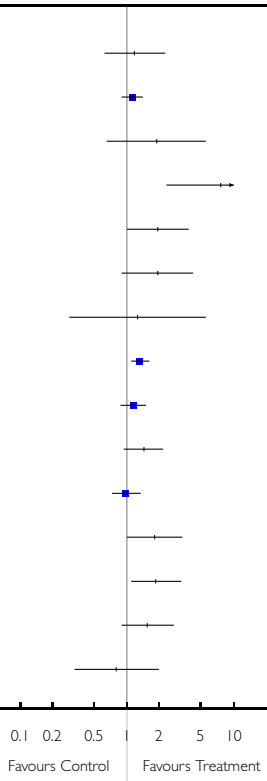
Analysis 1.1. Comparison 1 All nursing intervention vs control trials, grouped by intensity of intervention, Outcome 1 Smoking cessation at longest follow up.

Review: Nursing interventions for smoking cessation

Comparison: 1 All nursing intervention vs control trials, grouped by intensity of intervention

Outcome: 1 Smoking cessation at longest follow up

Study or subgroup	Treatment n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 High intensity intervention					
Allen 1996	9/14	6/11		0.8 %	1.18 [0.61, 2.29]
Bolman 2002	103/334	110/401		11.9 %	1.12 [0.90, 1.41]
Borrelli 2005	9/114	5/120		0.6 %	1.89 [0.65, 5.48]
Canga 2000	25/147	3/133		0.4 %	7.54 [2.33, 24.40]
Carlsson 1997	16/32	9/35		1.0 %	1.94 [1.00, 3.77]
Chouinard 2005	26/106	7/55		1.1 %	1.93 [0.89, 4.16]
Curry 2003	4/156	3/147		0.4 %	1.26 [0.29, 5.52]
DeBusk 1994	92/131	64/121		7.9 %	1.33 [1.09, 1.62]
Froelicher 2004	64/134	55/132		6.6 %	1.15 [0.88, 1.50]
Hanssen 2007	36/77	20/61		2.6 %	1.43 [0.93, 2.19]
Hennrikus 2005	66/666	68/678		8.0 %	0.99 [0.72, 1.36]
Hilberink 2005	39/244	13/148		1.9 %	1.82 [1.01, 3.29]
Hollis 1993	79/1997	15/710		2.6 %	1.87 [1.09, 3.23]
Kim 2005	28/200	18/201		2.1 %	1.56 [0.89, 2.73]
Lancaster 1999	8/249	10/248		1.2 %	0.80 [0.32, 1.99]



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Study or subgroup	Treatment n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Lewis 1998	4/62	3/61		0.4 %	1.31 [0.31, 5.62]
Miller 1997	245/1000	191/942		23.3 %	1.21 [1.02, 1.43]
Quist-Paulsen 2003	57/114	44/119		5.1 %	1.35 [1.00, 1.82]
Ratner 2004	10/114	11/114		1.3 %	0.91 [0.40, 2.06]
Rice 1994	24/207	16/48		3.1 %	0.35 [0.20, 0.60]
Rigotti 1994	22/44	22/43		2.6 %	0.98 [0.65, 1.48]
Sanz-Pozo 2006	3/60	4/65		0.5 %	0.81 [0.19, 3.48]
Taylor 1990	47/84	20/82		2.4 %	2.29 [1.50, 3.51]
Terazawa 2001	8/117	1/111		0.1 %	7.59 [0.96, 59.70]
Subtotal (95% CI)	**6403**	**4786**		**87.9 %**	**1.28 [1.18, 1.39]**
Total events: 1024 (Treatment), 718 (Control)					
Heterogeneity: Chi^2 = 56.41, df = 23 (P = 0.00012); I^2 =59%					
Test for overall effect: Z = 5.88 (P < 0.00001)					
2 Low intensity intervention					
Aveyard 2003	9/413	3/418		0.4 %	3.04 [0.83, 11.14]
Davies 1992	2/153	4/154		0.5 %	0.50 [0.09, 2.71]
Janz 1987	26/144	12/106		1.6 %	1.59 [0.84, 3.01]
Nagle 2005	48/698	54/696		6.4 %	0.89 [0.61, 1.29]
Nebot 1992	5/81	7/175		0.5 %	1.54 [0.51, 4.72]
Tonnesen 1996	8/254	3/253		0.4 %	2.66 [0.71, 9.90]
Vetter 1990	34/237	20/234		2.4 %	1.68 [1.00, 2.83]
Subtotal (95% CI)	**1980**	**2036**		**12.1 %**	**1.27 [0.99, 1.62]**
Total events: 132 (Treatment), 103 (Control)					
Heterogeneity: Chi^2 = 9.35, df = 6 (P = 0.16); I^2 =36%					
Test for overall effect: Z = 1.86 (P = 0.063)					
Total (95% CI)	**8383**	**6822**		**100.0 %**	**1.28 [1.18, 1.38]**
Total events: 1156 (Treatment), 821 (Control)					
Heterogeneity: Chi^2 = 65.74, df = 30 (P = 0.00018); I^2 =54%					
Test for overall effect: Z = 6.14 (P < 0.00001)					

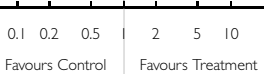
Analysis 2.1. Comparison 2 All nursing intervention vs control trials, grouped by setting and population, Outcome 1 Smoking cessation at longest follow up.

Review: Nursing interventions for smoking cessation

Comparison: 2 All nursing intervention vs control trials, grouped by setting and population

Outcome: 1 Smoking cessation at longest follow up

Study or subgroup	Treatment n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Smoking intervention as part of multifactorial intervention in patients with cardiovascular disease					
Allen 1996	9/14	6/11		6.5 %	1.18 [0.61, 2.29]
Carlsson 1997	16/32	9/35		8.3 %	1.94 [1.00, 3.77]
DeBusk 1994	92/131	64/121		63.9 %	1.33 [1.09, 1.62]
Hanssen 2007	36/77	20/61		21.4 %	1.43 [0.93, 2.19]
Subtotal (95% CI)	**254**	**228**		**100.0 %**	**1.39 [1.17, 1.65]**
Total events: 153 (Treatment), 99 (Control)					
Heterogeneity: Chi^2 = 1.44, df = 3 (P = 0.70); I^2 =0.0%					
Test for overall effect: Z = 3.71 (P = 0.00021)					
2 Smoking intervention alone in hospitalized smokers with a cardiovascular disease					
Bolman 2002	103/334	110/401		30.7 %	1.12 [0.90, 1.41]
Chouinard 2005	26/106	7/55		2.8 %	1.93 [0.89, 4.16]
Froelicher 2004	64/134	55/132		17.0 %	1.15 [0.88, 1.50]
Miller 1997	100/320	74/310		23.1 %	1.31 [1.01, 1.69]
Quist-Paulsen 2003	57/114	44/119		13.2 %	1.35 [1.00, 1.82]
Rigotti 1994	22/44	22/43		6.8 %	0.98 [0.65, 1.48]
Taylor 1990	47/84	20/82		6.2 %	2.29 [1.50, 3.51]
Subtotal (95% CI)	**1136**	**1142**		**100.0 %**	**1.29 [1.14, 1.45]**
Total events: 419 (Treatment), 332 (Control)					
Heterogeneity: Chi^2 = 12.04, df = 6 (P = 0.06); I^2 =50%					
Test for overall effect: Z = 4.19 (P = 0.000028)					
3 Smoking intervention alone in other hospitalized smokers					
Hennrikus 2005	66/666	68/678		26.2 %	0.99 [0.72, 1.36]
Lewis 1998	4/62	3/61		1.2 %	1.31 [0.31, 5.62]
Miller 1997	145/680	117/632		47.2 %	1.15 [0.93, 1.43]
Nagle 2005	48/698	54/696		21.1 %	0.89 [0.61, 1.29]
Ratner 2004	10/114	11/114		4.3 %	0.91 [0.40, 2.06]
Subtotal (95% CI)	**2220**	**2181**		**100.0 %**	**1.04 [0.89, 1.22]**



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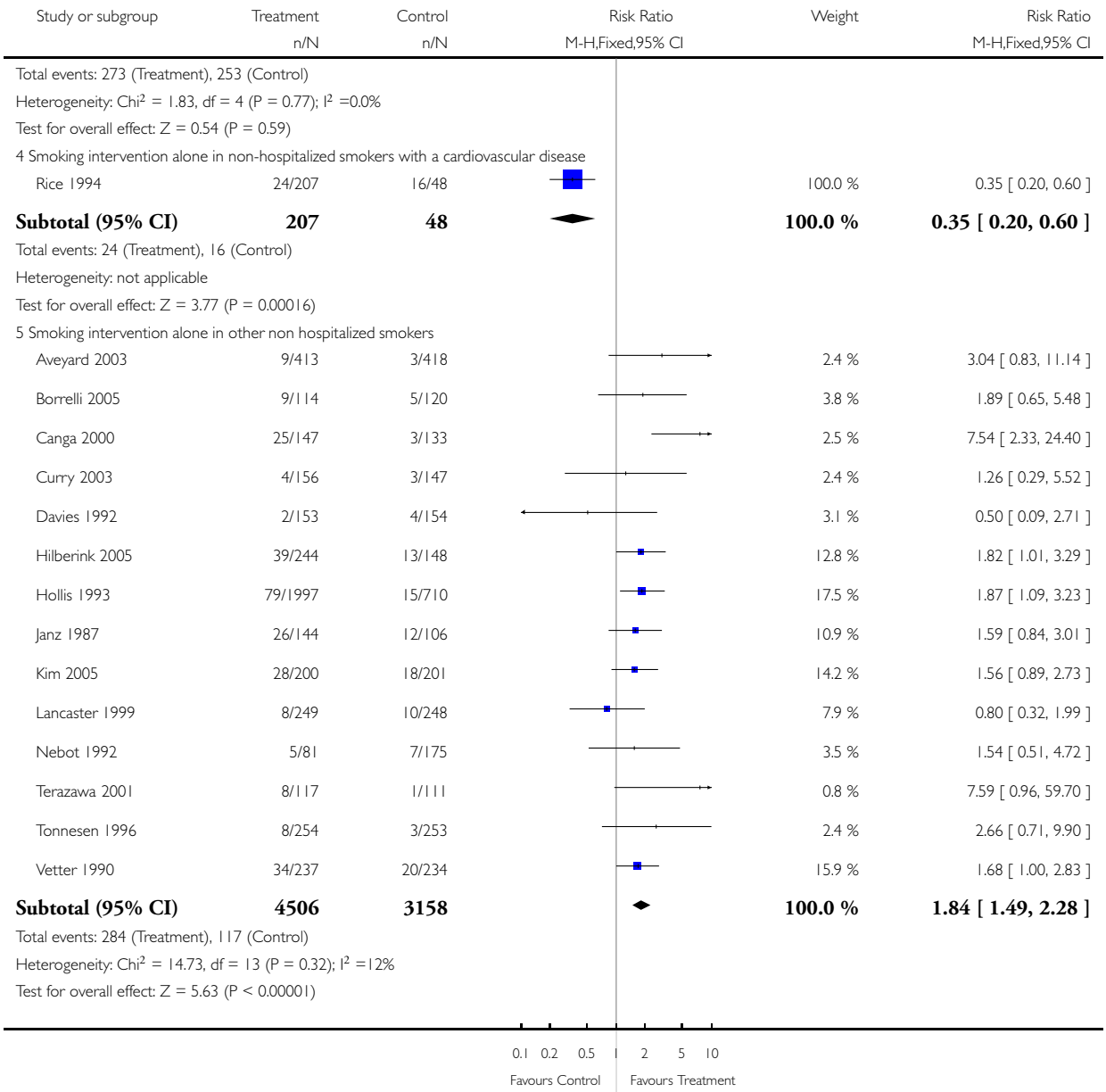
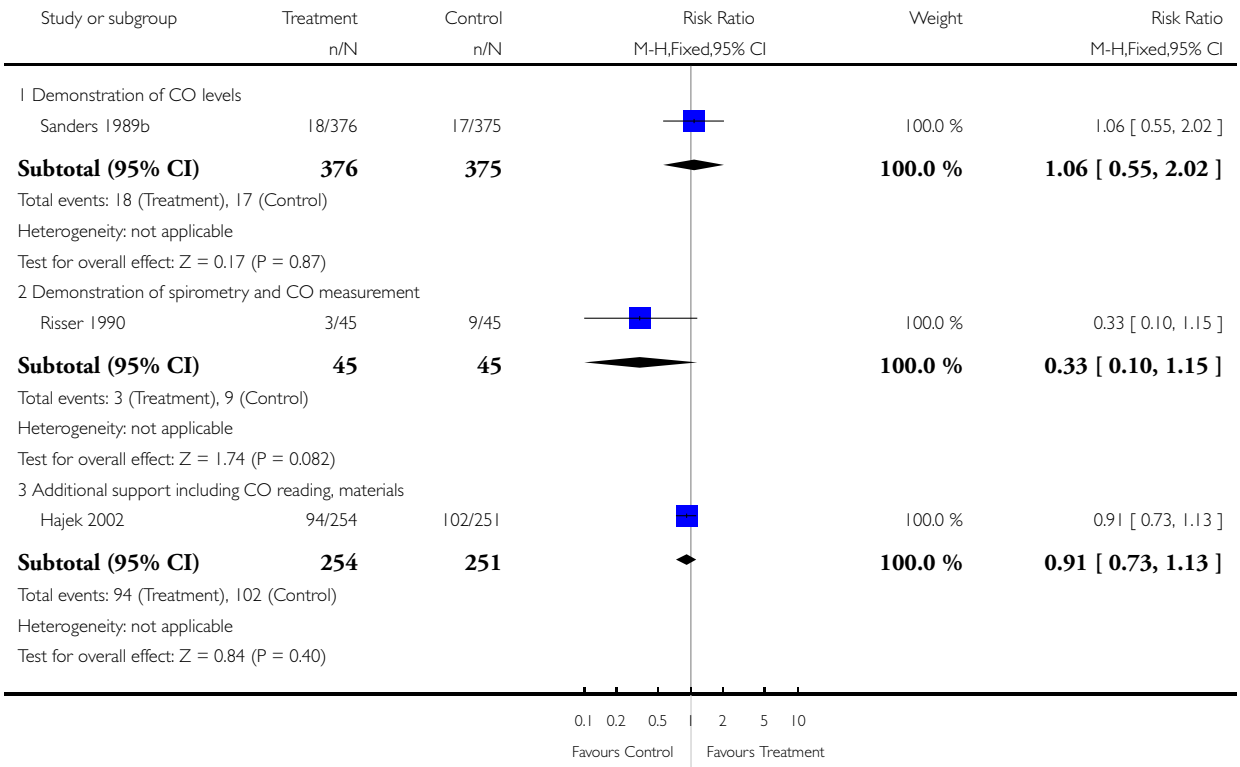


Analysis 3.1. Comparison 3 Effect of additional strategies: Higher versus lower intensity, Outcome 1 Additional components at single contact. Smoking cessation at longest follow up.

Review: Nursing interventions for smoking cessation

Comparison: 3 Effect of additional strategies: Higher versus lower intensity

Outcome: 1 Additional components at single contact. Smoking cessation at longest follow up

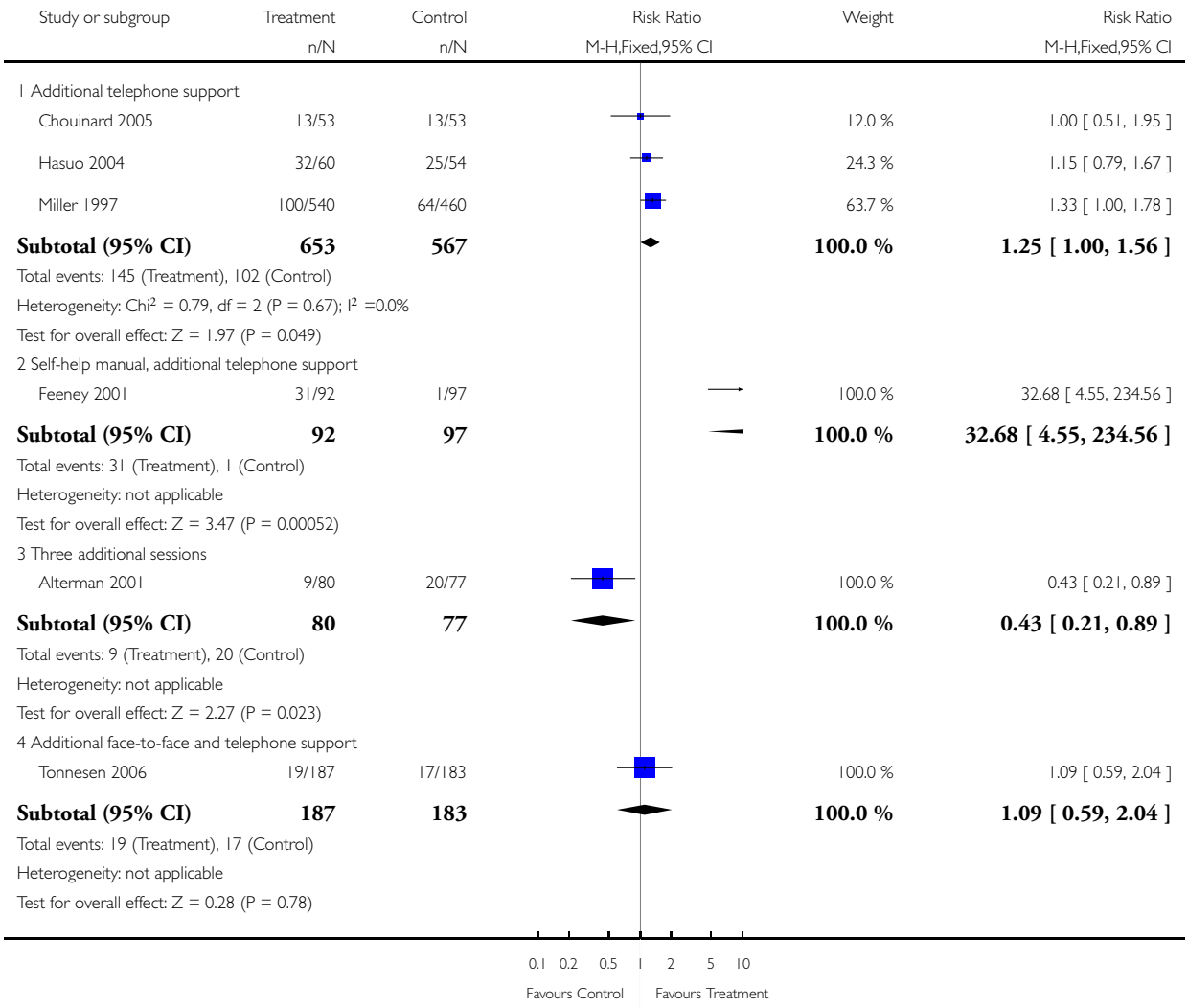


Analysis 3.2. Comparison 3 Effect of additional strategies: Higher versus lower intensity, Outcome 2 Additional contacts. Smoking cessation at longest follow up.

Review: Nursing interventions for smoking cessation

Comparison: 3 Effect of additional strategies: Higher versus lower intensity

Outcome: 2 Additional contacts. Smoking cessation at longest follow up

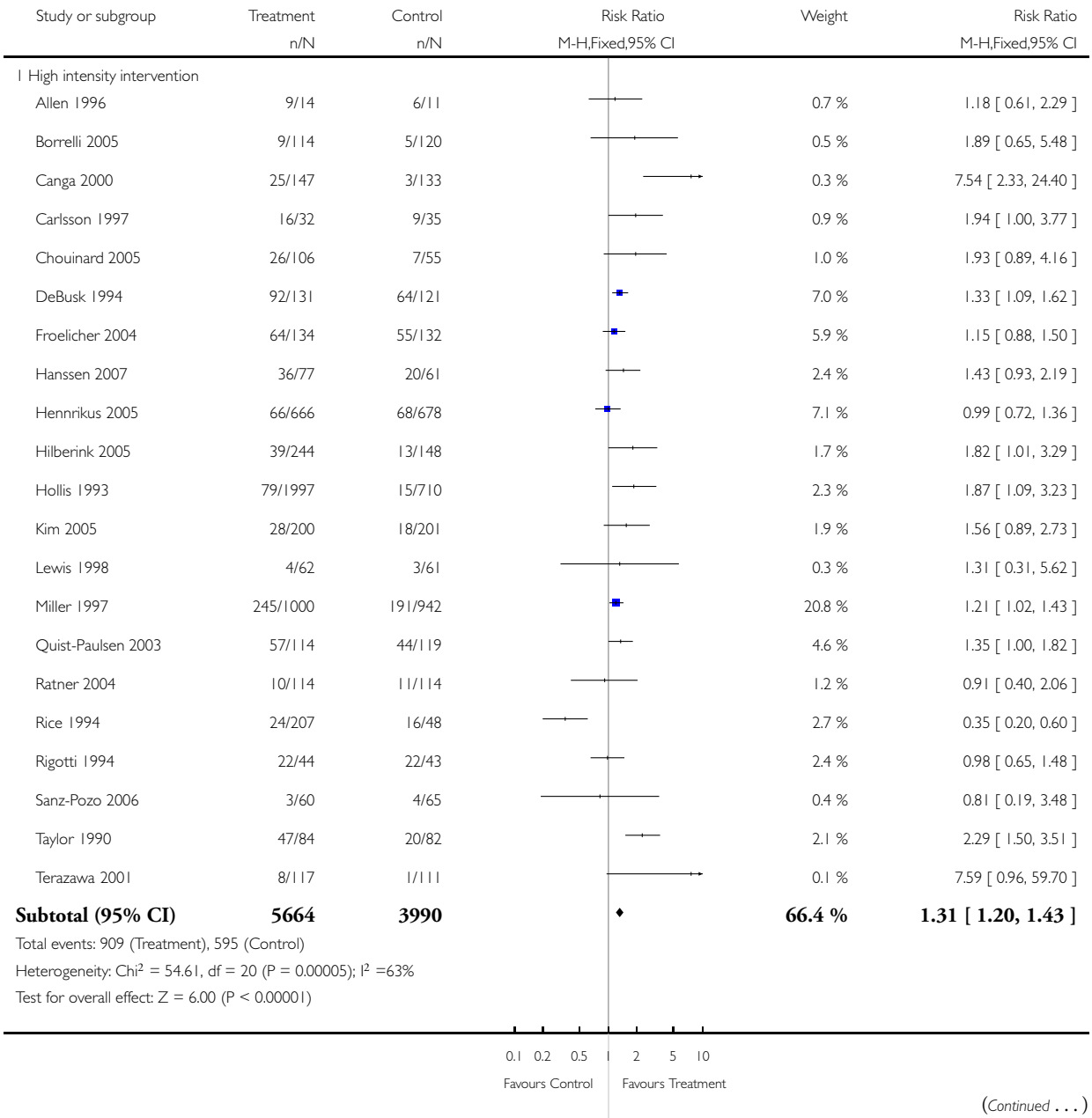


Analysis 4.1. Comparison 4 Sensitivity analysis by intensity, including Hajek 2002, with Lancaster, Bolman, Curry as low intensity, Outcome 1 Smoking cessation at longest follow up.

Review: Nursing interventions for smoking cessation

Comparison: 4 Sensitivity analysis by intensity, including Hajek 2002, with Lancaster, Bolman, Curry as low intensity

Outcome: 1 Smoking cessation at longest follow up



Study or subgroup	Treatment n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 High intensity intervention					
Allen 1996	9/14	6/11		0.7 %	1.18 [0.61, 2.29]
Borrelli 2005	9/114	5/120		0.5 %	1.89 [0.65, 5.48]
Canga 2000	25/147	3/133		0.3 %	7.54 [2.33, 24.40]
Carlsson 1997	16/32	9/35		0.9 %	1.94 [1.00, 3.77]
Chouinard 2005	26/106	7/55		1.0 %	1.93 [0.89, 4.16]
DeBusk 1994	92/131	64/121		7.0 %	1.33 [1.09, 1.62]
Froelicher 2004	64/134	55/132		5.9 %	1.15 [0.88, 1.50]
Hanssen 2007	36/77	20/61		2.4 %	1.43 [0.93, 2.19]
Hennrikus 2005	66/666	68/678		7.1 %	0.99 [0.72, 1.36]
Hilberink 2005	39/244	13/148		1.7 %	1.82 [1.01, 3.29]
Hollis 1993	79/1997	15/710		2.3 %	1.87 [1.09, 3.23]
Kim 2005	28/200	18/201		1.9 %	1.56 [0.89, 2.73]
Lewis 1998	4/62	3/61		0.3 %	1.31 [0.31, 5.62]
Miller 1997	245/1000	191/942		20.8 %	1.21 [1.02, 1.43]
Quist-Paulsen 2003	57/114	44/119		4.6 %	1.35 [1.00, 1.82]
Ratner 2004	10/114	11/114		1.2 %	0.91 [0.40, 2.06]
Rice 1994	24/207	16/48		2.7 %	0.35 [0.20, 0.60]
Rigotti 1994	22/44	22/43		2.4 %	0.98 [0.65, 1.48]
Sanz-Pozo 2006	3/60	4/65		0.4 %	0.81 [0.19, 3.48]
Taylor 1990	47/84	20/82		2.1 %	2.29 [1.50, 3.51]
Terazawa 2001	8/117	1/111		0.1 %	7.59 [0.96, 59.70]
Subtotal (95% CI)	**5664**	**3990**		**66.4 %**	**1.31 [1.20, 1.43]**
Total events: 909 (Treatment), 595 (Control)					
Heterogeneity: Chi² = 54.61, df = 20 (P = 0.00005); I² =63%					
Test for overall effect: Z = 6.00 (P < 0.00001)					

0.1 0.2 0.5 1 2 5 10

Favours Control Favours Treatment

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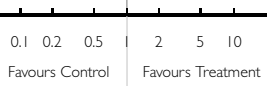
Study or subgroup	Treatment n/N	Control n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
2 Low intensity intervention					
Aveyard 2003	9/413	3/418		0.3 %	3.04 [0.83, 11.14]
Bolman 2002	103/334	110/401		10.6 %	1.12 [0.90, 1.41]
Curry 2003	4/156	3/147		0.3 %	1.26 [0.29, 5.52]
Davies 1992	2/153	4/154		0.4 %	0.50 [0.09, 2.71]
Hajek 2002	94/254	102/251		10.8 %	0.91 [0.73, 1.13]
Janz 1987	26/144	12/106		1.5 %	1.59 [0.84, 3.01]
Lancaster 1999	8/249	10/248		1.1 %	0.80 [0.32, 1.99]
Nagle 2005	48/698	54/696		5.7 %	0.89 [0.61, 1.29]
Nebot 1992	5/81	7/175		0.5 %	1.54 [0.51, 4.72]
Tonnesen 1996	8/254	3/253		0.3 %	2.66 [0.71, 9.90]
Vetter 1990	34/237	20/234		2.1 %	1.68 [1.00, 2.83]
Subtotal (95% CI)	**2973**	**3083**		**33.6 %**	**1.09 [0.96, 1.25]**
Total events: 341 (Treatment), 328 (Control)					
Heterogeneity: Chi² = 13.66, df = 10 (P = 0.19); I² =27%					
Test for overall effect: Z = 1.30 (P = 0.19)					
Total (95% CI)	**8637**	**7073**		**100.0 %**	**1.24 [1.15, 1.33]**
Total events: 1250 (Treatment), 923 (Control)					
Heterogeneity: Chi² = 72.93, df = 31 (P = 0.00003); I² =57%					
Test for overall effect: Z = 5.67 (P < 0.00001)					

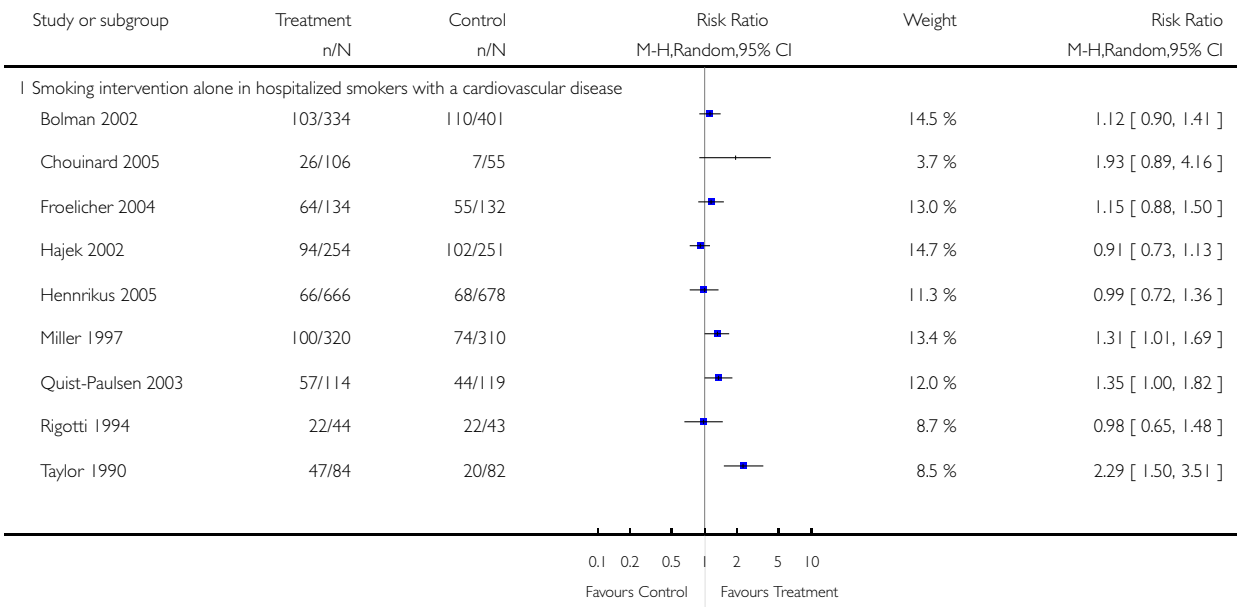


Analysis 5.1. Comparison 5 Sensitivity analysis by setting and population, including Hajek 2002, Outcome 1 Smoking cessation at longest follow up.

Review: Nursing interventions for smoking cessation

Comparison: 5 Sensitivity analysis by setting and population, including Hajek 2002

Outcome: 1 Smoking cessation at longest follow up



WHAT'S NEW

Last assessed as up-to-date: 20 October 2007.

29 October 2008	Amended	Converted to new review format.

HISTORY

Protocol first published: Issue 3, 1998

Review first published: Issue 3, 1999

21 October 2007	New citation required and minor changes	Updated for issue 1 2008 with 12 new studies included; no major changes to results. The conclusions did not change.

(*Continued*)

14 September 2003	New citation required and conclusions have changed	Updated for issue 1 2004 with 7 new studies. Conclusions now give more emphasis to possible differences between high and low intensity interventions.
14 October 2001	New citation required and minor changes	Updated for issue 3 2001 with 3 new studies. The conclusions did not change substantially.

CONTRIBUTIONS OF AUTHORS

VHR extracted data and wrote the review. LS conducted searches, extracted data and assisted in drafting the review. Both authors contribute to review updates.

DECLARATIONS OF INTEREST

V.H. Rice was the principal investigator in one of the studies included in this review.

SOURCES OF SUPPORT

Internal sources

- Wayne State University College of Nursing, Adult Health & Administration, USA.
- Department of Primary Health Care, Oxford University, UK.

External sources

- American Heart Association, USA.
- NHS Research & Development Programme, UK.

INDEX TERMS

Medical Subject Headings (MeSH)

*Counseling; *Nursing Care; Randomized Controlled Trials as Topic; Smoking [* prevention & control]; Smoking Cessation [* methods]

MeSH check words

Humans