Nursing interventions for smoking cessation (Review)

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ABSTRACT

Background
Health care 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 June 2003.

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.

Main results
Twenty-nine studies met the inclusion criteria. Twenty studies comparing a nursing intervention to a control or to usual care found the intervention to significantly increase the odds of quitting (Peto Odds Ratio 1.47, 95% CI 1.29 to 1.68). There was heterogeneity among the study results, but pooling using a random effects model did not alter the estimate of a statistically significant effect. There was limited 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. Five 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 the 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 interventions can be effective. 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

Advice and support from nurses may help people to stop smoking, especially when they are in hospital

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. The review of trials 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 may 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 (Molarius 2001). The following two factors may help to reduce the prevalence of cigarette smoking: (1) 79% (Emmons 1992) to 90% (Coultas 1991) of smokers want to quit smoking and (2) 70% of smokers visit a health care professional each year (CDC 1993; 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 (Whyte 2003).

Systematic reviews (e.g. Silagy 2004b) 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 targeted for pregnant smokers is not reviewed here because of the particular circumstance and motivation in 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 clients
(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 (Silagy 2004a). Studies in which advice about nicotine replacement was part of the nursing intervention are included.

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 recruited in any type of healthcare setting. The only exception was studies that only 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 intervention

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 ex-

cluded, 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

See: methods used in reviews.

We searched the Tobacco Addiction Review Group specialized register for trials (most recent search June 2003). 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 Silverplatter for 'nursing' and 'smoking cessation' from 1983 to June 2003.

METHODS OF THE REVIEW

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 (Clarke 2000).

(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 subjects); 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

The statistical methods used for pooling were as described by Peto's group (Yusuf 1985). We calculated for each trial the number of expected events (E) in the experimental group assuming that the intervention had no effect. This calculation is based on the number of subjects initially randomized, whether or not they completed the study. We subtracted the number of expected events (E) from the number that were actually observed (O) in the experimental group. By adding these separate differences (i.e. O-E), and their variances, we derive a statistic (and its variance) that is typical of the differences observed between experimental and control groups in the assembled trials. We used this to test the null hypothesis and also to estimate any differential effects. We used a fixed effect model to calculate the typical odds ratio and its 95% confidence intervals, which meant that participants in one trial were never directly compared with those in another. By using this approach we avoided differences in treatments, duration of treatments, follow-ups, and end-points that could interfere with estimates of effectiveness. This method does not assume that the size of any reduction in smoking cessation rates across trials must be similar. Results are expressed as an odds ratio (intervention: control) for achieving abstinence from smoking at a given point in time, together with the 95% confidence intervals. We assessed heterogeneity between study results using the I^2 statistic (Higgins 2003). This examines the percentage of total variation across studies due to heterogeneity rather than to chance. Values of I^2 over 75% indicate a high level of heterogeneity.

DESCRIPTION OF STUDIES

Twenty-nine trials met the inclusion criteria. They were of nursing interventions for smoking cessation, conducted between 1987 and 2003 in ten different countries with adults who used tobacco (primarily cigarettes). 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 30 studies. Eleven trials

intervened with hospitalized patients (Taylor 1990; Rigotti 1994; DeBusk 1994; Allen 1996; Carlsson 1997; Miller 1997; Lewis 1998; Canga 2000; Feeney 2001; Bolman 2002; Hajek 2002). One trial (Rice 1994) recruited hospitalized patients, but with the intervention given after discharge. Fourteen 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; Aveyard 2003). In some trials, the recruitment took place during a clinic visit whilst in others the invitation to enroll was made by letter. One study (Terazawa 2001) recruited employees during a workplace health check, two enrolled community-based adults motivated to quit (Davies 1992; Alterman 2001), and one recruited mothers taking their child to a pediatric clinic (Curry 2003). 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); one study was with patients with respiratory diseases (Tonnesen 1996) and one with patients with diabetes (Canga 2000).

Three 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). In all three studies, the smoking cessation component was clearly defined, of high intensity, and independently measurable.

Twenty studies with a total of over 10,000 people contributed to the main comparison of nursing intervention versus control. Fourteen were classified as high intensity on the basis of the planned intervention, although in some studies implementation may have been incomplete. In six, the intervention was classified as low intensity (Janz 1987; Vetter 1990; Davies 1992; Nebot 1992; Tonnesen 1996; Aveyard 2003). All 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 effect of including it in the main analysis of nursing intervention versus control.

Hajek 2002 and four other studies compared two interventions involving a nurse. 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). Two involved additional counselling sessions with a nurse (Alterman 2001; Feeney 2001). One other study compared two interventions with a usual care control (Miller 1997). The minimal 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. 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, five used nurses for whom the intervention was a core component of their nursing role (Hollis 1993; DeBusk 1994; Allen 1996; Carlsson 1997; Terazawa 2001). In six 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). In three of these, the same nurse provided all the interventions (Rigotti 1994; Lewis 1998; Canga 2000). In only three studies were intensive interventions intended to be delivered by nurses for whom it was not a core task (Lancaster 1999; Bolman 2002; Curry 2003). In the last of these the intervention was given either by paediatric nurses or by health educators. All the low intensity interventions were delivered by primary care or outpatient clinic nurses.

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.

METHODOLOGICAL QUALITY

Of the twenty-five studies used in the meta-analysis, ten (40%) were graded A for using a randomization and allocation concealment process likely to avoid selection bias. The majority employed some form of computer-generated allocation system. Five 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. Three studies allocated by provider rather than by individual participant: (a) by clinic session (Janz 1987); (b) by intervention teams (Nebot 1992); and (c) by hospital (Bolman 2002). In the latter study four of 11 hospitals selected their condition, although seven were randomly allocated. There were also baseline differences between 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 remaining studies not used in the meta-analysis one was adequate (Campbell 1998), three were unclear (Family Heart 1994; OXCHECK 1994; Steptoe 1999), and one was inadequate (Sanders 1989a).

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

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 13 (52%) of the twenty-five studies eligible for 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). Four studies (16%) 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).

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 restrospective 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).

RESULTS

Effects of intervention versus control/usual care.

Smokers offered advice by a nursing professional had an increased likelihood of quitting compared to smokers without a nursing intervention, but there was evidence of statistical heterogeneity between the results of the 20 studies contributing to this comparison (I^2=66.6%). Heterogeneity was particularly apparent in the subgroup of fourteen high intensity trials. There was one trial with a significant negative effect for treatment (Rice 1994) and three with large and significant positive effects (Taylor 1990; Canga 2000; Terazawa 2001). Pooling all trials gave an odds ratio (OR) of 1.47 with 95% confidence intervals (CI) 1.29 to 1.67 at the longest follow-up (Comparison 1). Because of the heterogeneity we re-analysed the data using a random effects model. This slightly increased the odds ratio, and widened the confidence intervals (OR 1.59, 95% CI 1.19 to 2. 13). Excluding four outlying trials marginally lowered the estimate (1.41, 95% CI 1.22 to 1.62) and removed the heterogeneity not attributable to chance (I^2=0%). 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 the study by Taylor et al (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 the study by Miller et al (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 who 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 effect of the nursing intervention. Use of NRT was also encouraged as part of the intervention by Canga et al (Canga 2000), with 17% of the intervention group accepting a prescription.

Effect of intervention intensity.

We detected no evidence from indirect comparisons that interventions that were classified as higher intensity were more effective in achieving successful quitting. Although the point estimate for the

pooled effect of lower intensity trials was larger, the confidence intervals were wide and overlapped with those for high intensity interventions. The pooled odds ratio for the 14 trials of higher intensity interventions was 1.43 (95% CI 1.24 to1.64) compared to an odds ratio of 1.76 (95% CI 1.23 to 1.53) for the six low intensity trials (Comparison 1). There was heterogeneity amongst the high intensity subgroup due to the outlying trials already described. We assessed the sensitivity of these 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. The distinction between low and high intensity subgroups was based on the intended intervention. Low levels of implementation were noted in Lancaster 1999, Bolman 2002 and Curry 2003, so we tested the effect of reclassifying them as low intensity. This reduced the point estimate of effect in the low intensity subgroup and increased it in the high intensity one. We also tested the effect of including a study in which the lower intensity of two nursing interventions was classified as usual care (Hajek 2002). This sensitivity analysis removed the significant effect of the lower intensity intervention versus control comparison. If this study and the three with low implementation are included in the low intensity subgroup, the pooled estimate of effect is small and non-significant (OR 1.19, 95% CI 0.98 to 1.44 [Comparison 4]).

Effects of differing health states and client settings.
Trials in hospitals recruited patients with health problems. Trials in primary care generally did not select patients with a particular health problem. Setting and disease diagnosis were therefore combined in one subgroup analysis. Three trials that included a smoking cessation intervention from a nurse as part of cardiac rehabilitation gave a pooled effect that more than doubled the odds of stopping smoking (OR 2.14, 95% CI 1.39 to 3.31). There was heterogeneity (I^2=66.5%) amongst trials in hospitalized smokers with cardiovascular disease due to the strong intervention effect in one of the four trials (Taylor 1990). The pooled estimated OR was 1.44 (95% CI 1.16 to 1.78). The largest trial of the four found an effect that just reached statistical significance (Miller 1997). A sensitivity analysis of the effect of including Hajek 2002 in this category increased the heterogeneity (I^2=76.4%), and pooling using a random effects model then failed to detect a significant benefit (Comparison 5). Amongst non-cardiac hospitalized smokers the odds ratio for cessation was 1.20, but the confidence intervals did not exclude no effect (two trials, 95% CI 0.92 to 1.56). We found no evidence for an effect of an intervention in one trial (Rice 1994) amongst non-hospitalized adults with cardiovascular disease (OR 0.19, 95% CI 0.08 to 0.46). 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.

Smoking interventions in 11 trials in other non-hospitalized adults gave an estimated 90% increase in the odds of success (OR 1.90, 95% CI 1.48 to 2.43). A sensitivity analysis testing the effect of excluding the three trials (Janz 1987; Vetter 1990; Curry 2003) where a combination of a nursing intervention and advice from a physician was used did not alter the effect (OR 2.02, 95% CI 1.48 to 2.75).

Effects of additional telephone support
Repeated telephone support (Miller 1997) increased the cessation rate, although the lower confidence interval was only one, (OR 1.40, 95% CI 1.00 to 1.96).

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. The pooled odds ratio was 0.79 (95% CI 0.44 to 1.44).

Effects of other components
One trial in hospitalized smokers with CVD (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 (OR 0.86, 95% CI 0.60 to 1.23)

Effects of additional 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 sessions rather than one with a nurse 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.

Results for 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 positive effect for smoking cessation intervention by nursing. 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. The direction of effect was consistent in different intensities of intervention, in different settings, and in smokers with and without tobacco-related illnesses. 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.

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) contributed 37% of the weight to the overall analysis, while the next largest added 17% 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 is an inverse relationship between number of cigarettes smoked per day and success in quitting; the more addicted the individuals, the more difficult it is 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 three 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 effects for high and low intensity smoking cessation interventions by nurses, as was found in a review of physicians' advice (Silagy 2004b). 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 between 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 'stop 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 updating the review in 2003, we note that the evidence for the benefit of a low intensity intervention may be weaker than that for a more intensive intervention, and it 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 an 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 of intervention. No studies were found of of brief opportunistic advice directly analagous to the low intensity interventions used in trials of physician advice (Silagy 2004b), since the main purpose for initiating contacts with patients in the trials in this review was to address smoking behaviour.

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.

There was some evidence that the effect of an intervention was greater in patients with diagnosed cardiovascular disease. This pattern was evident in hospitalized smokers who received cessation information alone or who received cessation instruction as part of a multifactorial intervention. However, two of the multifactorial intervention trials (Allen 1996; Carlsson 1997) did not use biochemical validation of quitting and in the third (DeBusk 1994) we were unable to confirm the proportion of drop-outs with the study authors. The impact of the intervention may therefore have been overestimated.

One study (Miller 1997) provided data on the effect of the same interventions in smokers with different types of illness and showed a greater effect for intervention 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 an 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 (Rigotti 2003) has been conducted and supports the efficacy of interventions for this patient group.

Providing additional physiological feedback in the form of spirometry and demonstrated carbon monoxide level as an adjunct to a 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 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 11 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. Baseline quit rates were relatively low in all studies, and this, combined with the modest increase in the odds of quitting, means that 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 could be large.

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 take-up 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 con-

cluded 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 health 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 (Silagy 2004a). 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.

POTENTIAL CONFLICT OF INTEREST

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

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**Indicates the major publication for the study*

TABLES

Characteristics of included studies

Study	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.
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

Characteristics of included studies (*Continued*)

Notes	Data on number of quitters derived from percentages. Likely to include some who stopped prior to intervention.
Allocation concealment	A – Adequate

Study	**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 7 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	New for 2004/1 update 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 randomised of 80 used here.
Allocation concealment	B – Unclear

Study	**Aveyard 2003**
Methods	Country: UK Recruitment setting: 65 general practices, invitation by letter Randomization: questionnaire read optically, allocation by computer using minimisation
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	New for 2004/1 update 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 group recruited during 4 arm section of trial (additional data from author website www.publichealth.bham.ac.uk/berg/pdf/Addiction2003.pdf). This increases apparent benefit of nurse intervention.
Allocation concealment	A – Adequate

Study	**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)
Participants	789 smokers who had smoked in previous week. 25 deaths, 38 refusals, 64 missing baseline data excluded from analysis denominator.

Characteristics of included studies (*Continued*)

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. Nurses had 2 hours training. 2. Usual care (nurses on control wards intended to be blind to status) Intensity: Low (to moderate)
Outcomes	Abstinence at 12m (no smoking since hospital discharge) Validation: none (bogus pipeline)
Notes	New for 2004/1 update 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 OR & confidence intervals from regression analysis
Allocation concealment	C – Inadequate

Study	**Campbell 1998**
Methods	Country: Scotland Recruitment setting: GP (Family Practice) Intervention: within 3 months 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 OR for non-smoking
Allocation concealment	A – Adequate

Study	**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) Same nurse delivered all interventions
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
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
Allocation concealment	B – Unclear

Characteristics of included studies (*Continued*)

Study	**Carlsson 1997**
Methods	Country: Sweden Recruitment setting: Hospital CCU. Intervention at home 4 weeks after discharge. Randomization: method not stated
Participants	168 survivors of acute MI. 67 smokers amongst them defined as present smoker by questionnaire.
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 9 months. 2. Usual care, follow-up by general practitioners Intensity: high
Outcomes	Abstinence at 12m Validation: none
Notes	
Allocation concealment	B – Unclear

Study	**Curry 2003**
Methods	Country: USA Recruitment setting: mothers attending 4 pediatric clinics, unselected by motivation Randomization: selection of coloured ping-pong ball
Participants	303 women (any smoking), 23% in precontemplation av age 33, av cigs/day 12
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 3 months from nurse. 2. No intervention Intensity: high (but implementation incomplete
Outcomes	Abstinence sustained at 3 & 12m. (Point prevalence also reported) Validation: CO <10ppm, only for women followed up in person. Tabulated rates based on self report
Notes	New for 2004/1 update. 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 one phone call.
Allocation concealment	C – Inadequate

Study	**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 cigarettes per day
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
Allocation concealment	B – Unclear

Characteristics of included studies (*Continued*)

Study	**DeBusk 1994**
Methods	Country: USA (California) Recruitment setting: inpatients 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 6 months before admission.
Interventions	1. Multiple risk factor intervention case-management system with smoking cessation, nutritional counselling, lipid lowering therapy and exercise therapy. Smoking cessation: 2min 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 $50 (2% enrolled) Intensity: high
Outcomes	Abstinence at 1yr (point prevalence) Validation: plasma cotinine <10ng/mL, or 11-15 ng/mL with expired CO <10ppm.
Notes	Number of quitters derived from smoking cessation rates based on number of baseline smokers - Author contacted for smoker drop-out rates.
Allocation concealment	A – Adequate

Study	**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 1 year than in either internal or external practice controls. However non-returners in the intervention group had a higher smoking prevalence at baseline than returners.
Allocation concealment	B – Unclear

Study	**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
Interventions	1. Stanford Heart Attack Staying Free programme. Review by Alcohol & Drug Assessment (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 1 & 3m. Validation: urine cotinine <400ng/ml at each ADAU clinic visit

Characteristics of included studies (*Continued*)

Notes	New for 2004/1 update 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.
Allocation concealment	A – Adequate

Study	**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
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 6week follow-up and for visits at 12m)
Notes	New for 2004/1 update Control meets criteria for a low intensity intervention so not included in main comparison
Allocation concealment	A – Adequate

Study	**Hollis 1993**
Methods	Country: USA (Portland, OR) Recruitment: Intern. med/ 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 M.D. advice (30 sec and pamphlet from nurse) 2. Brief M.D. 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 M.D. advice plus nurse-promoted group programme - advice, CO, + video-ask to join group with schedule, coupon, etc., follow-up calls 4. Brief MD advice and nurse offered choice between self-directed and group-assisted quit - shown both types of materials. Intensity: high
Outcomes	Abstinence at 1yr (2 point prevalence) 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.
Allocation concealment	C – Inadequate

Study	**Janz 1987**
Methods	Country: USA (Michigan) Recruitment setting: OPD Med Clinic (R.A.) Randomization: Half-day clinics assigned to treatment status.
Participants	Smokers (>= 5 cigs/day) attending clinics

Characteristics of included studies (*Continued*)

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.
Allocation concealment	C – Inadequate

Study	**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. cigs/day 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	Sustained abstinence at 12m (not smoking at 3 & 12m) Validation: saliva cotinine at 3 & 12m
Notes	2 vs 1. Only 30% took up offer of extended counselling
Allocation concealment	A – Adequate

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

Study	**Miller 1997**
Methods	Country: USA (California) Recruitment setting: hospital inpatients

Characteristics of included studies (*Continued*)

	Randomization: sealed envelopes
Participants	1942 hospitalized smokers (any tobacco use in week prior to admission)
Interventions	1. Intensive: 30min counselling, video, workbook, relaxation tape + 4 phone calls 2. Minimal: 30min counselling etc + 1 phone call 3. Usual Care Intensity: high
Outcomes	Abstinence at 12m, also sustained abstinence (3m & 6m self-report) Validation: plasma cotinine or family member collaboration at 12m
Notes	1+2 vs 3 in main analysis - both interventions classified 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).
Allocation concealment	A – Adequate

Study	**Nebot 1992**
Methods	Country: Spain Recruitment: Primary Care Center (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 cig/day 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, 2m & 12m) Validation: 1/4 validated by expired CO at 2m.
Notes	3 vs 1
Allocation concealment	C – Inadequate

Study	**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.
Allocation concealment	B – Unclear

Study	**Rice 1994**
Methods	Country: USA (Michigan) Recruitment: Self-referral or by provider Randomization: table of random numbers

Characteristics of included studies (*Continued*)

Participants	255 smokers (>= 10 cigs/day) with cardiovascular disease
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: respondents warned that saliva samples might be tested (bogus pipeline).
Notes	1+2+3 vs 4
Allocation concealment	B – Unclear

Study	**Rigotti 1994**
Methods	Country: USA (Boston) Setting/ Recruitment: Cardiac surgery unit Randomization: method not described
Participants	87 smokers (1 or more pack of cigs in past 6ms) 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
Allocation concealment	B – Unclear

Study	**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 counseling program. 2. as 1. plus 10min personalised motivational intervention with spirometry, CO measurement and discussion of symptoms.
Outcomes	Abstinence at 1yr (point prevalence) Validation: expired CO
Notes	Not in main comparison: effect of additional components. No group without intervention. (No true control group.)
Allocation concealment	B – Unclear

Study	**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

Characteristics of included studies (*Continued*)

	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 point prevalence abstinence rates were 11.2% for intervention, 10% for control (NS).
Allocation concealment	C – Inadequate

Study	**Sanders 1989b**
Methods	Country: UK Setting: Primary care clinics (11) Randomization: method not specifically 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
Allocation concealment	B – Unclear

Study	**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 session + 1-2 phone contacts. NRT used if appropriate. 2. Usual care
Outcomes	Sustained abstinence at 12m (4 & 12m) Validation: saliva cotinine
Notes	Not included in meta-analysis. Used practice-based analysis. Differential drop-out rates for smokers in int & control.
Allocation concealment	B – Unclear

Study	**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 6ms. 2. Usual care control

Characteristics of included studies (*Continued*)

	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.
Allocation concealment	A – Adequate

Study	**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 cigs/day 23
Interventions	1. 15-20min stage-matched counselling by trained nurses. 4 follow-up calls for those willing to set a quit date. 1 week after intervention, 3-4 days , 1m, 3m after cessation 2. Usual care
Outcomes	Sustained abstinence at 12m (>6m, validated at 6 & 12m) Validation: CO, urine
Notes	New for 2004/1 update 25 from intervention group set quit date. More intervention group in Preparation/contemplation II subgroups at baseline; 17 vs 7.
Allocation concealment	A – Adequate

Study	**Tonnesen 1996**
Methods	Country: Denmark Recruitment setting: Outpatient chest clinic Randomization: method not specifically described
Participants	507 smokers of <10 cigs/day or of >10 cigs/day who had refused a trial of nicotine replacement. 20-70 yrs Nurses given 8h training and 3 problem-solving meetings
Interventions	1. Motivational approach, 5 min of benefits/risks, brochures in hazards and how to quit. 4-6 weeks 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
Notes	
Allocation concealment	B – Unclear

Study	**Vetter 1990**
Methods	Country: Wales, UK Recruitment setting: general practice (family practice) Randomization: method not specifically 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 2. No contact, completed questionnaire only

	Intensity: low
Outcomes	Abstinence at 6m (point prevalence) Validation: expired CO (cut off point not stated)
Notes	Intervention included nursing and physician advice
Allocation concealment	B – Unclear

ITT = intent-to-treat. CO = carbon monoxide CABG = Coronary Artery Bypass Graft CCU = Coronary Care Unit (A)MI = (Acute) Myocardial Infarction NRT = nicotine replacement therapy

Characteristics of excluded studies

Study	Reason for exclusion
Browning 2000	Not a randomised trial, uses historical control
Carlsson 1998	Describes five studies, only one reporting smoking cessation is included in review separately (Carlsson 1997).
Fletcher 1987	Number of quitters after 6m not stated. (Total of 20 participants)
Galvin 2001	Only 3 month follow-up. (Total of 42 participants)
Griebel 1998	Maximum follow-up was 6 weeks post-hospital discharge.
Haddock 1997	No long term follow-up. Randomization unclear.
Jelley 1995	Not RCT. Control and intervention ran sequentially.
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 1998.
Lifrak 1997	Four advice sessions with a nurse practitioner was 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 1998.
Pozen 1977	Intervention in post MI patients. Only 1 month follow-up, and number of smokers at baseline not described.
Reeve 2000	Follow-up less than 6 months.
Rigotti 1997	Intervention not given by a nurse.
Stanislaw 1994	Follow-up less than 6 months.
Sun 2000	Follow-up less than 6 months.
Wadland 1999	Not randomised. The two 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 6 months (90 days). Nurses and counsellors provided telephone based intervention.
Wewers 1994	Follow-up less than 6 months.
Woollard 1995	No data presented on number of smokers or quitting.
van Elderen 1994	Multicomponent intervention, smoking cessation element not clear.

Characteristics of ongoing studies

Study	Froelicher 2000
Trial name or title	Women's initiative for Nonsmoking (WINS)

Characteristics of ongoing studies (*Continued*)

Participants	Women admitted to study hospitals with a CVD diagnosis
Interventions	Nurse-managed care focusing on preventing relapse after cessation during hospitalisation. Face to face and telephone counselling
Outcomes	Long term cessation
Starting date	October 1996. Data collection completed December 1998
Contact information	E.S. Froelicher, University of California, 2 Kirkham St, San Francisco, CA 94143-0610
Notes	

Study	**Project C.A.R.E.S.**
Trial name or title	Community-Nurse Assisted Research and Education on Smoking
Participants	Visiting nurses (N=104) trained to deliver one of two interventions
Interventions	Nurses delivered Motivational Enhancement or brief advice (self-help).
Outcomes	12 month cessation
Starting date	1997
Contact information	Belinda Borrelli, Brown University
Notes	

ANALYSES

Comparison 01. All nursing intervention vs control trials, grouped by intensity of intervention

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Smoking cessation at longest follow-up	20	10289	Peto Odds Ratio 95% CI	1.47 [1.29, 1.67]

Comparison 02. All nursing intervention vs control trials, grouped by setting and population

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Smoking cessation at longest follow-up			Peto Odds Ratio 95% CI	Subtotals only

Comparison 03. Effect of additional strategies: Higher versus lower intensity

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
04 Smoking cessation at longest follow-up			Odds Ratio (Fixed) 95% CI	Totals not selected

Comparison 04. Sensitivity analysis by intensity, including Hajek 2002, with Lancaster, Bolman, Curry as low intensity

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Smoking cessation at longest follow-up	21	10794	Peto Odds Ratio 95% CI	1.38 [1.22, 1.56]

Comparison 05. Sensitivity analysis by setting and population, including Hajek 2002

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Smoking cessation at longest follow-up			Odds Ratio (Random) 95% CI	Subtotals only

INDEX TERMS

Medical Subject Headings (MeSH)

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

MeSH check words

Humans

COVER SHEET

Title	Nursing interventions for smoking cessation
Authors	Rice VH, Stead LF
Contribution of author(s)	VHR extracted data and wrote the review. LS conducted searches, extracted data and assisted in drafting the review. Both authors contribute to review updates.
Issue protocol first published	1998/3
Review first published	1999/3
Date of most recent amendment	23 May 2005
Date of most recent SUBSTANTIVE amendment	18 November 2003
What's New	Review substantively updated Issue 1, 2004. Seven new studies (Alterman 2001, Aveyard 2003, Bolman 2002, Curry 2003, Feeney 2001, Hajek 2002, Terazawa 2001). The conclusions give more emphasis to possible differences between high and low intensity interventions.
Date new studies sought but none found	Information not supplied by author
Date new studies found but not yet included/excluded	Information not supplied by author
Date new studies found and included/excluded	20 June 2003
Date authors' conclusions section amended	15 September 2003

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GRAPHS AND OTHER TABLES

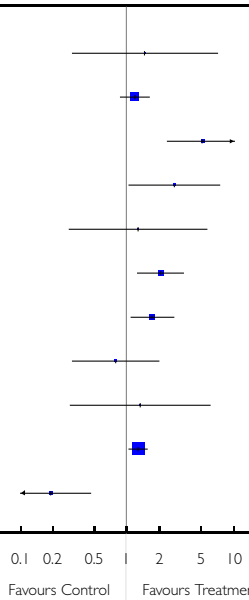
Analysis 01.01. Comparison 01 All nursing intervention vs control trials, grouped by intensity of intervention, Outcome 01 Smoking cessation at longest follow-up

Review: Nursing interventions for smoking cessation

Comparison: 01 All nursing intervention vs control trials, grouped by intensity of intervention

Outcome: 01 Smoking cessation at longest follow-up

Study	Treatment n/N	Control n/N	Peto Odds Ratio 95% CI	Weight (%)	Peto Odds Ratio 95% CI
01 High intensity intervention					
Allen 1996	9/14	6/11		0.7	1.48 [0.30, 7.16]
Bolman 2002	103/334	110/401		16.6	1.18 [0.86, 1.62]
Canga 2000	25/147	3/133		2.8	5.12 [2.35, 11.17]
Carlsson 1997	16/32	9/35		1.8	2.78 [1.04, 7.44]
Curry 2003	4/156	3/147		0.8	1.26 [0.28, 5.63]
DeBusk 1994	92/131	64/121		6.6	2.08 [1.25, 3.46]
Hollis 1993	79/1997	15/710		7.8	1.73 [1.09, 2.77]
Lancaster 1999	8/249	10/248		1.9	0.79 [0.31, 2.03]
Lewis 1998	4/62	3/61		0.7	1.33 [0.29, 6.07]
Miller 1997	245/1000	191/942		37.3	1.27 [1.03, 1.58]
Rice 1994	24/207	16/48		2.3	0.19 [0.08, 0.46]



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Study	Treatment n/N	Control n/N	Peto Odds Ratio 95% CI	Weight (%)	Peto Odds Ratio 95% CI
Rigotti 1994	22/44	22/43		2.4	0.96 [0.41, 2.20]
Taylor 1990	47/84	20/82		4.4	3.68 [1.98, 6.83]
Terazawa 2001	8/117	1/111		1.0	4.75 [1.26, 17.99]
Subtotal (95% CI)	4574	3093		87.0	1.43 [1.24, 1.64]
Total events: 686 (Treatment), 473 (Control)					
Test for heterogeneity chi-square=52.42 df=13 p=<0.0001 I^2 =75.2%					
Test for overall effect z=4.98 p<0.00001					
02 Low intensity intervention					
Aveyard 2003	9/413	3/418		1.3	2.79 [0.89, 8.71]
Davies 1992	2/153	4/154		0.7	0.51 [0.10, 2.57]
Janz 1987	26/144	12/106		3.5	1.68 [0.84, 3.38]
Nebot 1992	5/81	7/175		1.1	1.62 [0.47, 5.63]
Tonnesen 1996	8/254	3/253		1.2	2.52 [0.76, 8.31]
Vetter 1990	34/237	20/234		5.3	1.77 [1.00, 3.12]
Subtotal (95% CI)	1282	1340		13.0	1.76 [1.23, 2.53]
Total events: 84 (Treatment), 49 (Control)					
Test for heterogeneity chi-square=3.26 df=5 p=0.66 I^2 =0.0%					
Test for overall effect z=3.07 p=0.002					
Total (95% CI)	5856	4433		100.0	1.47 [1.29, 1.67]
Total events: 770 (Treatment), 522 (Control)					
Test for heterogeneity chi-square=56.83 df=19 p=<0.0001 I^2 =66.6%					
Test for overall effect z=5.75 p<0.00001					

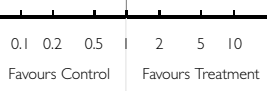
Analysis 02.01. Comparison 02 All nursing intervention vs control trials, grouped by setting and population, Outcome 01 Smoking cessation at longest follow-up

Review: Nursing interventions for smoking cessation

Comparison: 02 All nursing intervention vs control trials, grouped by setting and population

Outcome: 01 Smoking cessation at longest follow-up

Study	Treatment n/N	Control n/N	Peto Odds Ratio 95% CI	Weight (%)	Peto Odds Ratio 95% CI
01 Smoking intervention as part of multifactorial intervention in patients with cardiovascular disease					
Allen 1996	9/14	6/11		7.5	1.48 [0.30, 7.16]
Carlsson 1997	16/32	9/35		19.5	2.78 [1.04, 7.44]
DeBusk 1994	92/131	64/121		73.0	2.08 [1.25, 3.46]
Subtotal (95% CI)	177	167		100.0	2.14 [1.39, 3.31]
Total events: 117 (Treatment), 79 (Control)					
Test for heterogeneity chi-square=0.50 df=2 p=0.78 I^2 =0.0%					
Test for overall effect z=3.45 p=0.0006					
02 Smoking intervention alone in hospitalized smokers with a cardiovascular disease					
Bolman 2002	103/334	110/401		44.4	1.18 [0.86, 1.62]
Miller 1997	100/320	74/310		37.3	1.45 [1.02, 2.05]
Rigotti 1994	22/44	22/43		6.5	0.96 [0.41, 2.20]
Taylor 1990	47/84	20/82		11.9	3.68 [1.98, 6.83]
Subtotal (95% CI)	782	836		100.0	1.44 [1.16, 1.78]
Total events: 272 (Treatment), 226 (Control)					
Test for heterogeneity chi-square=11.27 df=3 p=0.01 I^2 =73.4%					
Test for overall effect z=3.33 p=0.0009					
03 Smoking intervention alone in other hospitalized smokers					
Lewis 1998	4/62	3/61		3.1	1.33 [0.29, 6.07]
Miller 1997	145/680	117/632		96.9	1.19 [0.91, 1.56]
Subtotal (95% CI)	742	693		100.0	1.20 [0.92, 1.56]
Total events: 149 (Treatment), 120 (Control)					
Test for heterogeneity chi-square=0.02 df=1 p=0.89 I^2 =0.0%					
Test for overall effect z=1.32 p=0.2					
04 Smoking intervention alone in non hospitalized smokers with a cardiovascular disease					
Rice 1994	24/207	16/48		100.0	0.19 [0.08, 0.46]
Subtotal (95% CI)	207	48		100.0	0.19 [0.08, 0.46]
Total events: 24 (Treatment), 16 (Control)					
Test for heterogeneity: not applicable					
Test for overall effect z=3.72 p=0.0002					
05 Smoking intervention alone in other non hospitalized smokers					



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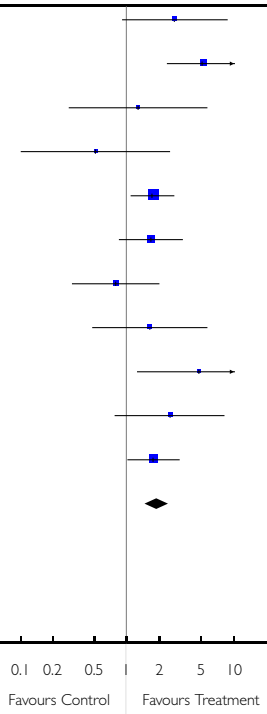
Study	Treatment n/N	Control n/N	Peto Odds Ratio 95% CI	Weight (%)	Peto Odds Ratio 95% CI
Aveyard 2003	9/413	3/418		4.8	2.79 [0.89, 8.71]
Canga 2000	25/147	3/133		10.2	5.12 [2.35, 11.17]
Curry 2003	4/156	3/147		2.8	1.26 [0.28, 5.63]
Davies 1992	2/153	4/154		2.4	0.51 [0.10, 2.57]
Hollis 1993	79/1997	15/710		28.5	1.73 [1.09, 2.77]
Janz 1987	26/144	12/106		12.8	1.68 [0.84, 3.38]
Lancaster 1999	8/249	10/248		7.1	0.79 [0.31, 2.03]
Nebot 1992	5/81	7/175		4.0	1.62 [0.47, 5.63]
Terazawa 2001	8/117	1/111		3.5	4.75 [1.26, 17.99]
Tonnesen 1996	8/254	3/253		4.4	2.52 [0.76, 8.31]
Vetter 1990	34/237	20/234		19.4	1.77 [1.00, 3.12]
Subtotal (95% CI)	3948	2689		100.0	1.90 [1.48, 2.43]
Total events: 208 (Treatment), 81 (Control)					
Test for heterogeneity chi-square=15.23 df=10 p=0.12 I^2 =34.3%					
Test for overall effect z=5.02 p<0.00001					



Analysis 03.04. Comparison 03 Effect of additional strategies: Higher versus lower intensity, Outcome 04 Smoking cessation at longest follow-up

Review: Nursing interventions for smoking cessation

Comparison: 03 Effect of additional strategies: Higher versus lower intensity

Outcome: 04 Smoking cessation at longest follow-up

Study	Treatment n/N	Control n/N	Odds Ratio (Fixed) 95% CI	Odds Ratio (Fixed) 95% CI
01 Demonstration of CO levels				
Sanders 1989b	18/376	17/375		1.06 [0.54, 2.09]
02 Demonstration of spirometry and CO measurement				
Risser 1990	3/45	9/45		0.29 [0.07, 1.14]
03 Additional support including CO reading, materials				
Hajek 2002	94/254	102/251		0.86 [0.60, 1.23]
04 Additional telephone support				
Miller 1997	100/540	64/460		1.41 [1.00, 1.98]
05 S-H manual, additional telephone support				
Feeney 2001	31/92	1/97		48.79 [6.49, 366.68]
06 Three additional sessions				
Alterman 2001	9/80	20/77		0.36 [0.15, 0.85]

Analysis 04.01. Comparison 04 Sensitivity analysis by intensity, including Hajek 2002, with Lancaster, Bolman, Curry as low intensity, Outcome 01 Smoking cessation at longest follow-up

Review: Nursing interventions for smoking cessation

Comparison: 04 Sensitivity analysis by intensity, including Hajek 2002, with Lancaster, Bolman, Curry as low intensity

Outcome: 01 Smoking cessation at longest follow-up

Study	Treatment n/N	Control n/N	Peto Odds Ratio 95% CI	Weight (%)	Peto Odds Ratio 95% CI
01 High intensity intervention					
Allen 1996	9/14	6/11		0.6	1.48 [0.30, 7.16]
Canga 2000	25/147	3/133		2.5	5.12 [2.35, 11.17]
Carlsson 1997	16/32	9/35		1.5	2.78 [1.04, 7.44]
DeBusk 1994	92/131	64/121		5.8	2.08 [1.25, 3.46]
Hollis 1993	79/1997	15/710		6.8	1.73 [1.09, 2.77]
Lewis 1998	4/62	3/61		0.6	1.33 [0.29, 6.07]
Miller 1997	245/1000	191/942		32.9	1.27 [1.03, 1.58]

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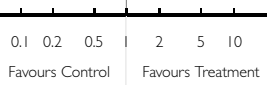
Study	Treatment n/N	Control n/N	Peto Odds Ratio 95% CI	Weight (%)	Peto Odds Ratio 95% CI
Rice 1994	24/207	16/48		2.0	0.19 [0.08, 0.46]
Rigotti 1994	22/44	22/43		2.1	0.96 [0.41, 2.20]
Taylor 1990	47/84	20/82		3.9	3.68 [1.98, 6.83]
Terazawa 2001	8/117	1/111		0.8	4.75 [1.26, 17.99]
Subtotal (95% CI)	3835	2297		59.8	1.52 [1.30, 1.78]
Total events: 571 (Treatment), 350 (Control)					
Test for heterogeneity chi-square=48.91 df=10 p=<0.0001 I^2 =79.6%					
Test for overall effect z=5.19 p<0.00001					
02 Low intensity intervention					
Aveyard 2003	9/413	3/418		1.2	2.79 [0.89, 8.71]
Bolman 2002	103/334	110/401		14.6	1.18 [0.86, 1.62]
Curry 2003	4/156	3/147		0.7	1.26 [0.28, 5.63]
Davies 1992	2/153	4/154		0.6	0.51 [0.10, 2.57]
Hajek 2002	94/254	102/251		11.7	0.86 [0.60, 1.23]
Janz 1987	26/144	12/106		3.1	1.68 [0.84, 3.38]
Lancaster 1999	8/249	10/248		1.7	0.79 [0.31, 2.03]
Nebot 1992	5/81	7/175		1.0	1.62 [0.47, 5.63]
Tonnesen 1996	8/254	3/253		1.1	2.52 [0.76, 8.31]
Vetter 1990	34/237	20/234		4.7	1.77 [1.00, 3.12]
Subtotal (95% CI)	2275	2387		40.2	1.19 [0.98, 1.44]
Total events: 293 (Treatment), 274 (Control)					
Test for heterogeneity chi-square=11.72 df=9 p=0.23 I^2 =23.2%					
Test for overall effect z=1.74 p=0.08					
Total (95% CI)	6110	4684		100.0	1.38 [1.22, 1.56]
Total events: 864 (Treatment), 624 (Control)					
Test for heterogeneity chi-square=64.41 df=20 p=<0.0001 I^2 =68.9%					
Test for overall effect z=5.12 p<0.00001					



Analysis 05.01. Comparison 05 Sensitivity analysis by setting and population, including Hajek 2002, Outcome 01 Smoking cessation at longest follow-up

Review: Nursing interventions for smoking cessation

Comparison: 05 Sensitivity analysis by setting and population, including Hajek 2002

Outcome: 01 Smoking cessation at longest follow-up