

Telephone counselling for smoking cessation (Review)

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ABSTRACT

Background

Telephone services can provide information and support for smokers. Counselling may be provided proactively or offered reactively to callers to smoking cessation helplines.

Objectives

To evaluate the effect of proactive and reactive telephone support to help smokers quit.

Search strategy

We searched the Cochrane Tobacco Addiction Group trials register for studies using free text term 'telephone*' or the keywords 'telephone counselling' or 'Hotlines' or 'Telephone'. Date of the most recent search: January 2006.

Selection criteria

Randomized or quasi-randomized controlled trials in which proactive or reactive telephone counselling to assist smoking cessation was offered to smokers or recent quitters.

Data collection and analysis

Trials were identified and data extracted by one person (LS) and checked by a second (TL). The main outcome measure was the odds ratio for abstinence from smoking after at least six months follow up. We selected the strictest measure of abstinence, using biochemically validated rates where available. We considered participants lost to follow-up to be continuing smokers. Where trials had more than one arm with a less intensive intervention we used only the most similar intervention without the telephone component as the control group in the primary analysis. We assessed statistical heterogeneity amongst sub groups of clinically comparable studies using the I^2 statistic. Where appropriate, we pooled studies using a fixed-effect model. A meta-regression was used to investigate the effect of differences in planned number of calls.

Main results

Forty-eight trials met the inclusion criteria. Among smokers who contacted helplines, quit rates were higher for groups randomised to receive multiple sessions of call-back counselling (eight studies, >18,000 participants, odds ratio (OR) for long term cessation 1.41, 95% confidence interval (CI) 1.27 to 1.57). Two of these studies showed a significant benefit of more intensive compared to less intensive intervention. Telephone counselling not initiated by calls to helplines also increased quitting (29 studies, >17,000 participants, OR 1.33, 95% CI 1.21 to 1.47). A meta-regression detected a significant association between the maximum number of planned calls and the effect size. There was clearer evidence of benefit in the subgroup of trials recruiting smokers motivated to quit. Of two studies that provided access to a hotline one showed a significant benefit and one did not. Two studies comparing different counselling approaches during a single session did not detect significant differences. A further seven studies were too diverse to contribute to meta-analyses and are discussed separately.

Authors' conclusions

Proactive telephone counselling helps smokers interested in quitting. There is evidence of a dose response; one or two brief calls are less likely to provide a measurable benefit. Three or more calls increases the odds of quitting compared to a minimal intervention such as

providing standard self-help materials, brief advice, or compared to pharmacotherapy alone. Telephone quitlines provide an important route of access to support for smokers, and call-back counselling enhances their usefulness.

PLAIN LANGUAGE SUMMARY

Telephone counselling can help as part of a programme to help people stop smoking

Smoking contributes to many health problems including cancers and heart and lung diseases. People trying to quit smoking can be helped with medication or through behavioural support such as specialist counselling and group therapy. Support, information and counselling are offered either face-to-face or by telephone. Counselling via telephone hotlines can be provided as part of a programme or separately, and can potentially reach large numbers of people. Our review of trials found telephone counselling to be effective; multiple sessions are likely to be most helpful.

BACKGROUND

Behavioural and pharmacological interventions help people to quit smoking. Behavioural approaches range from brief advice from a physician to intensive specialist counselling (Lancaster 2004; Lancaster 2005a; Stead 2005). Support can be given in individual counselling sessions (Lancaster 2005a) or in group therapy (Stead 2005) where clients can share problems and derive support from one another. Standard self-help materials have at best a small effect helping quitting while those tailored to the characteristics of individuals are more likely to be effective (Lancaster 2005b). Telephone counselling may supplement face-to-face support, or substitute for face-to-face contact as an adjunct to self-help interventions or pharmacotherapy. Counselling may be helpful in planning a quit attempt, and helping prevent relapse during the initial period of abstinence (Brandon 2000). Although intensive face-to-face intervention increases quit rates, there are difficulties in delivering it to large numbers. Telephone counselling may be a way of providing individual counselling more cheaply. Telephone contact can be timed to maximise the level of support around a planned quit date, and can be scheduled in response to the needs of the recipient.

Telephone counselling can be proactive or reactive (Lichtenstein 1996). In a proactive approach the counsellor initiates one or more calls to provide support in making a quit attempt or avoiding relapse. This can be offered as part of an intervention including face-to-face counselling, or provided as an adjunct to a mailed self-help programme, or to pharmacotherapy. Smokers may get access to this form of support by calling quitlines.

Reactive counselling is provided via quitlines, helplines or hotlines that take calls from smokers or their friends and family. These telephone services may offer information, recorded messages, personal counselling or a mixture of components (Ossip-Klein 2003). They may provide a regional or national service. They are often advertised in conjunction with population-wide campaigns such as No-Smoking Days. Helplines may also be provided on a smaller scale

for a specific project or population. Although in general, reactive helplines respond only to client-initiated calls, in some models smokers may request counselling calls which are made from the call centre (Zhu 1996; Zhu 2000), and there is then some overlap with the proactive approach. Hotlines have the potential to provide access to information for large numbers of people. Some services have reported reaching substantial proportions of the target population (Ossip-Klein 1991; Platt 1997). They have the potential to reach under-served populations such as ethnic minorities (Zhu 2000). A further development of hotlines uses computers and expert systems to provide a menu of automated responses (Burke 1993; Ramelson 1999; Schneider 1995).

Telephone-based services may be specific to smoking, as for example the California Smokers' Helpline, Quitline in Australia, or Quit in the UK, or they may be embedded in broader health information services such as the Cancer Information Service in the USA. They may also be provided as part of an integrated smoking cessation support service (e.g. Glasgow 1991). Access to hotlines or the opportunity to register to receive calls from a counsellor may also be offered as a part of a cessation programme including pharmacotherapy.

Controlled evaluation of reactive helplines has been limited by a reluctance among providers to refuse support to those requesting help. Evaluations usually compare variants in service rather than including a no-intervention control (e.g. Balanda 1999; Davis 1992). Proactive services have been more widely evaluated because they can more easily be compared with a minimal intervention. For example, Zhu 2002 used an innovative approach for evaluating the benefit of the counselling component for callers to a quitline. Because the number of requests for counselling sometimes exceeded the quitline's capacity, all callers at these times were sent a self-help pack and invited to call back. Counselling capacity could then be equitably allocated by randomizing some callers to a group who were contacted proactively, whilst the control group were counselled only if and when they called back.

OBJECTIVES

The review evaluated the effect of telephone support to help smokers quit, including proactive or reactive counselling, or the provision of other information to smokers calling a helpline.

We tried to address the following questions:

- Do telephone calls from a counsellor increase quit rates compared to other cessation interventions alone?
- Do telephone calls from a counsellor increase quit rates compared to pharmacotherapy alone?
- Does an increase in the number of telephone contacts increase quit rates?
- Do differences in counselling protocol related to the type or timing of support lead to differences in quit rates? There were limited data to address this question
- Does the availability of a reactive helpline increase quit rates?

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

Randomized or quasi-randomized controlled trials, with the unit of allocation individual participants, group, intervention site or geographical area.

Types of participants

Smokers or recent quitters. The definition of recent quitters was that used by the trial recruitment protocols, or by the participants themselves. We excluded trials that exclusively recruited quitters or were focused on telephone counselling as an intervention for relapse, as they fall within the scope of a separate Cochrane review on preventing relapse (Hajek 2005). We included trials recruiting exclusively teens or pregnant women but we considered them as a potential source of heterogeneity in meta-analyses. There are separate Cochrane reviews for these population groups (Lumley 2004; Grimshaw 2005).

Types of intervention

Provision of proactive or reactive telephone counselling to assist smoking cessation, to any population. We excluded studies if the contribution of the telephone component could not be evaluated independently of face-to-face counselling. We included studies which combined telephone counselling with self-help materials as the effect of self-help materials alone is limited (Lancaster 2005b).

Types of outcome measures

Smoking cessation at least six months after the start of intervention. We excluded trials with shorter follow up.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: Cochrane Tobacco Addiction Group methods used in reviews.

We identified studies from the Tobacco Addiction Group Specialised Register using the free text terms 'telephone*', 'quitline*' or 'helpline*' or the keywords 'telephone counselling' or 'Hotlines' or 'Telephone'. This register incorporates the results of systematic searches for trials on tobacco addiction in MEDLINE, EMBASE, PsycINFO and Science Citation Index electronic databases and includes trials reported in conference abstracts including Society for Research on Nicotine and Tobacco meetings. The register was searched in January 2006 for records indexed in these databases to the end of December 2005. We also checked studies cited in previous reviews (Lichtenstein 1996; McBride 1999c).

METHODS OF THE REVIEW

We identified controlled studies where an intervention arm included telephone contact. Data from included studies were extracted by one author (LS) and checked by a second (TL). We recorded the following information in the Table of Included Studies:

- The country and setting of the trial
- The method of recruitment to the study
- The method of randomization and allocation concealment
- Details of participants, including whether they were selected according to motivation to quit, and their age, sex and average baseline cigarette consumption
- Description of intervention and control, including the schedule of telephone contacts
- Definition of smoking abstinence used for the primary outcome, including timing of longest follow up and whether quit status was based on recent behaviour (point prevalence abstinence, e.g. in past seven days) or on abstinence for an extended period since a quit date or a previous follow up (continuous or sustained abstinence).
- Description of method of any biochemical validation or other method used to confirm self-reported quitting.

In the Table of Excluded Studies, we describe studies not meeting the inclusion criteria because of short follow up, or use of an intervention that combined telephone and face-to-face counselling, or because they were uncontrolled evaluations of helplines.

The quality of allocation concealment was scored as A if it was judged that foreknowledge of treatment assignment was

prevented, B if there was insufficient information about the process of allocation and C if a clearly unsatisfactory method was used.

The primary outcome was the number of quitters at the longest follow up, using the strictest measure of abstinence reported. We preferred sustained and biochemically validated abstinence to point prevalence and/or self-reported quitting. If a less strict definition of quitting seemed more appropriate for showing an effect of the intervention on recovery from lapses or relapses we planned a sensitivity analysis. The denominator was the number randomized, with losses to follow up assumed to be continuing smokers. We noted any exceptions in the study details.

We report pooled results as an odds ratio for the likelihood of quitting at the longest follow up. Where trials had more than one arm with a less intensive intervention we used only the most similar intervention without a telephone component as the control group in the primary analysis. We considered pooling of study results if both the intervention and control arms were sufficiently similar. We assessed statistical heterogeneity between trials using the I^2 statistic which describes the percentage of total variation between studies that is due to heterogeneity rather than chance (Higgins 2003). Values over 50% suggest moderate heterogeneity, and values over 75% substantial heterogeneity. Where appropriate we performed meta-analysis using a Mantel-Haenszel fixed-effect method to estimate a pooled odds ratio with 95% confidence intervals (Greenland 1985). This replaces the Peto method for pooling data (Yusuf 1985) used in previous versions of the review, but does not change the estimated effects substantially.

We also ran a meta-regression in STATA to test the association of intensity - defined as maximum number of calls - with effect size. The effect size was summarized using the (natural) logarithm of the odds ratio per trial with weights given by the standard error of the logarithm of the odds ratio. The only independent variable used was intensity defined as the maximum number of calls allowed in the intervention arm of the trial.

Subgroups

We did not combine proactive and reactive approaches to counselling, so studies that provided access to a telephone helpline but did not call participants form a separate category. In previous versions of this review we noted heterogeneity between studies of proactive telephone counselling, which was not explained by using subgroups based on the amount of support given for the control group. Lichtenstein (Lichtenstein 2002a) has suggested that studies recruiting smokers who call quitlines should be considered separately. These studies share the characteristics that participants were actively seeking support at the time of their call, and that telephone counselling was the primary intervention. We have followed this suggestion in the present update. We expected differences between the relative effect of telephone support depending on whether it was being tested as the main intervention to aid cessation, or as an extra part of a multicomponent cessation programme. Therefore a priori we treated as separate

subgroups those studies in which telephone counselling was the most intensive component of a minimal contact intervention and studies in which telephone counselling was assessed as an adjunct to face-to-face counselling. Where results of studies differed within the broad groupings described above we considered the following possible explanations: the difference between the intensity of the counselling based on the number of calls, the counselling strategy used, and the characteristics of the participants, in particular their motivation to quit or stage of change at baseline.

DESCRIPTION OF STUDIES

Forty-eight controlled studies met the criteria for inclusion in the review, with a total of over 36,000 participants. Two trials have not yet been published in full and data are based on published abstracts (Hollis 2005; Rabius 2005). One trial was published after the search date but was included because it had been identified as relevant from a conference abstract (Gilbert 2006). Most trials were conducted in North America or Australia. One was conducted in Hong Kong (Abdullah 2005), one in New Zealand (Rodgers 2005), and two in the UK (Aveyard 2003; Gilbert 2006). Participants were predominantly older adults with an average age typically in the 40s. One study recruited teenagers (Lipkus 2004), one recruited young mobile phone users with an average age of 22 (Rodgers 2005), one recruited adults aged over 60 (Ossip-Klein 1997) and one adults over 50 (Rimer 1994). Three recruited pregnant women (McBride 1999b; McBride 2004; Stotts 2002) and a further four recruited only women (McBride 1999a; McClure 2005; Solomon 2000; Solomon 2005). Three predominantly recruited men (Abdullah 2005; An 2006; Osinubi 2003).

Most of the trials used proactive counselling calls; only four assessed interventions that did not involve a counsellor contacting a participant (McFall 1993; Orleans 1998; Ossip-Klein 1991; Thompson 1993). Some other studies recruited participants who had phoned a quitline, but the intervention involved proactive contacts. Additional details are in the Table of Included Studies. The number, duration and content of the telephone calls was variable. The potential number of calls ranged from one to twelve (Solomon 2005) and in some studies was flexible. The length of calls was also varied; a duration of 10 to 20 minutes was common, although the initial call might be longer. The call schedule could be spaced over weeks or months. Amongst studies that did not recruit participants on the basis of their willingness to make a quit attempt, the content was typically individualized to enhance motivation in those undecided about quitting or to support a quit attempt where appropriate. Counselling was most commonly provided by professional counsellors or trained healthcare professionals. One trial used trained postgraduate students (Aveyard 2003). Three trials used trained peer counsellors, in one case survivors of childhood cancer (Emmons 2005), in the other two, women ex-smokers (Solomon 2000; Solomon 2005).

We grouped trials into three broad categories: trials assessing the effect of providing access to a helpline, trials of interventions for smokers who contacted a helpline, and trials that offered support proactively in other settings. Finally there are seven trials that do not fit into any of these categories, so are considered individually.

1. Trials providing access to a helpline

Two studies assessed the impact of offering reactive counselling by providing access to a helpline/quitline/hotline. One randomized counties to hotline access or not, and followed up smokers who were planning to stop and had registered for a smokers' self-help project (Ossip-Klein 1991). One combined newsletter mailings and hotline access compared to no follow-up support for smokers who had registered for a self-help televised cessation programme (McFall 1993). A third study is now excluded as it provided access to a hotline as an intervention for recent quitters (Brandon 2000) and is covered in a separate review focusing on relapse prevention (Hajek 2005).

2. Trials of interventions for people calling helplines

Ten trials recruited people who had phoned helplines/quitlines. We distinguished between two studies comparing different interventions provided during the initial call and eight testing the effect of additional proactive calls. Of the two that involved a single call, one compared a counselling approach based on the stage of change model to the provision of more general information (Thompson 1993). The other compared counselling and materials targeted at African-American smokers to standard advice and materials (Orleans 1998).

Amongst the eight studies that tested proactive calls back to people who had initiated the contact with the quitline the number of calls varied, with three studies comparing more than one schedule. There were small differences in the support for the control group. In one trial, all participants had brief counselling during their initial call (Borland 2001), in three, some control group participants received some counselling (Borland 2003; Gilbert 2006; Zhu 2002) and in the others the control group received self-help materials (Hollis 2005; Rabius 2004; Smith 2004; Zhu 1996).

3 Trials of proactive counselling, not initiated by calls to quitlines

There were twenty-nine trials in this category that were judged to have sufficient common features to consider pooling their results. There were some differences in the intensity of the telephone component, the amount of cessation support that was common to both the control and intervention groups, and the populations recruited.

In sixteen studies (Abdullah 2005; Aveyard 2003; Curry 1995; Emmons 2005; Lando 1992; Lichtenstein 2000; Lipkus 2004; McBride 1999a; McBride 1999b; McClure 2005; Miguez 2002; Orleans 1991; Ossip-Klein 1997; Prochaska 1993; Prochaska 2001; Rimer 1994) proactive telephone counselling calls were the only form of personal contact in the cessation intervention. Phar-

macotherapy was not systematically offered to all participants. In two further studies that recruited patients through healthcare systems, advice and support were part of usual care, but the telephone counselling was delivered independently of any clinic visit rather than being an adjunct to a specific episode of care (An 2006; Lipkus 1999). In a study randomizing women still smoking at the end of pregnancy, all participants had received brief provider advice in early pregnancy followed by mailed self-help materials (Stotts 2002). In one study all participants could enrol in the Free & Clear phone-based support programme which could also provide access to pharmacotherapy; this was used more by intervention than control groups (McClure 2005). One study (An 2006) encouraged the use of nicotine replacement therapy (NRT) or bupropion for intervention group participants making a quit attempt and this increased their use although pharmacotherapy was available to all participants as part of their usual care. Four trials incorporated brief face-to-face advice for all participants, without pharmacotherapy (Brown 1992; McBride 2004; Ockene 1991; Osinubi 2003). The support common to all participants ranged from a single information session and the provision of a self-help manual (Brown 1992); usual prenatal care including provider advice and self-help materials (McBride 2004); advice or brief counselling from a physician (relevant arms of Ockene 1991); and advice from an occupational physician to consult a personal physician (Osinubi 2003).

In seven trials there was a systematic offer or provision of NRT (Fiore 2004; Lando 1997; MacLeod 2003; Ockene 1991; Reid 1999; Solomon 2000; Solomon 2005). The support common to all participants ranged from: physician advice and offer of free nicotine gum (relevant arms of Ockene 1991); provision of free nicotine patch after a primary care visit (Fiore 2004); three sessions of physician advice and free nicotine patch (Reid 1999); a single 90 minute session, a free prescription for nicotine patch and access to a helpline (Lando 1997), or provision of free nicotine patch but no face-to-face contact (MacLeod 2003 (two week supply only); Solomon 2000; Solomon 2005).

The intensity and scheduling of the telephone counselling in this group of studies consisted of: a single call (Fiore 2004); one or two calls (Lipkus 1999); up to two calls (Lichtenstein 2000); two calls over two weeks (Lando 1992); two calls over two months (Ossip-Klein 1997); two calls over 20 weeks (Rimer 1994); two calls in late pregnancy (Stotts 2002); three calls over six months (Aveyard 2003; Prochaska 2001); up to three calls over 10 weeks (Curry 1995); three calls two to three weeks apart (Lipkus 2004); three calls over three months (Abdullah 2005; McBride 1999a; Ockene 1991); three calls over 13 weeks (Reid 1999); three calls during pregnancy (McBride 1999b part); four calls over 12 weeks (Lando 1997); four calls over six months (McClure 2005; Prochaska 1993); four calls over 60 weeks (Orleans 1991); five calls over 10 weeks and access to a hotline (MacLeod 2003); five calls and access to a hotline (Osinubi 2003); six calls over six weeks (Miguez 2002); six calls, three during pregnancy and three post-partum (McBride 1999b part; McBride 2004); up to six calls in seven

months (Emmons 2005); six calls over 10 weeks (Brown 1992); seven calls (An 2006); multiple calls (average seven) for up to three months (Solomon 2000) and up to 12 calls for up to four months (Solomon 2005).

In most trials the control groups received self-help materials by post. In nine trials there was a single mailing of standard materials (Abdullah 2005; An 2006; Emmons 2005; Lichtenstein 2000; Lipkus 2004 (mailing also included a video to increase use of written materials); McClure 2005; Orleans 1991; Ossip-Klein 1997 (two additional supportive letters) and Rimer 1994 (tailored for older smokers). Miguez 2002 provided six mailings of standard materials. Six studies provided individually tailored materials; the number of mailings could depend on return of questionnaires (Aveyard 2003; up to three mailings); Curry 1995 (single mailing with tailored feedback); Lipkus 1999 (single mailing); McBride 1999b (single mailing with tailored letter); Prochaska 1993 (up to three); Prochaska 2001 (up to three). In three trials the control group received no intervention or usual care: Lando 1992; McBride 1999a; Stotts 2002 (in this trial all participants had received advice and materials in early pregnancy). Two of the studies also provided both intervention and control groups with details of a hotline to contact for support (Prochaska 1993; Ossip-Klein 1997).

In 10 trials participants were recruited from the general population using advertisements, eight for smokers planning to or interested in quitting (Brown 1992; MacLeod 2003; Miguez 2002; Orleans 1991; Ossip-Klein 1997; Rodgers 2005; Solomon 2000; Solomon 2005) and two for any smoker irrespective of current interest in quitting (Prochaska 1993; Rimer 1994). Three trials recruited smokers during healthcare visits (Fiore 2004; Reid 1999; Ockene 1991). In three trials contact was initiated with smokers who had not been specifically recruited to a trial (Lando 1992; Curry 1995; McBride 1999a). Abdullah 2005 recruited smoking parents of children in a birth cohort study by telephone. Aveyard 2003 recruited smokers by mailed invitation from their primary care provider. An 2006 recruited smokers interested in making a quit attempt within 30 days, by mailed invitation to patients of Veterans Administration Medical Centres. Emmons 2005 recruited smokers from a cohort study of childhood cancer survivors. Lando 1997 recruited health maintenance organization members through a mixture of advertising and referral. Lichtenstein 2000 recruited smokers in households that were offered free radon testing kits. Lipkus 1999 recruited African-American clients of a community health centre. Lipkus 2004 recruited teens approached in shopping malls. McBride 1999b recruited women who had booked a prenatal appointment. McBride 2004 recruited women at their first prenatal visit. McClure 2005 recruited women in a healthcare organization who had had an abnormal cervical smear. Osinubi 2003 recruited asbestos-exposed workers and retirees attending medical screening. Prochaska 2001 recruited members of a healthcare organization using health behaviour telephone sur-

veys. Stotts 2002 recruited women identified at prenatal booking who were still smoking in late pregnancy.

4. Other studies

We identified seven other studies where we judged the nature of the main intervention or the conditions compared to be so distinctively different to any other included studies that they are described separately rather than being pooled. Three of these did not have a no-telephone support control; two (Miller 1997; Swan 2003) compared interventions with different numbers of calls, and one (Mermelstein 2003) compared different counselling approaches whilst controlling for contact time. Miller 1997 assessed the effect of increasing the amount of telephone follow-up after an inpatient counselling intervention. Swan 2003 compared two intensities of behavioural support, both of which involved telephone contact without face-to-face support, for smokers also randomized to one of two doses of bupropion. Mermelstein 2003 compared two telephone counselling protocols for people who had completed a seven week group behavioural programme. One counselling protocol offered non-specific support whilst the other provided an enhanced intervention tailored to smoking status.

Two studies (Roski 2003; Katz 2004) used telephone counselling as a core component of a system level intervention. Roski 2003 investigated providing access to a telephone counselling referral service as a means to increase health care providers' adherence to clinical practice guidelines. Patient smoking outcomes were assessed but telephone counselling was not offered to all eligible smokers in intervention clinics. Katz 2004 also tested an intervention based on clinical practice guidelines. The intervention was implemented in primary care clinics and included training intake clinicians in giving brief advice, recording smoking status as a vital sign, and offering telephone counselling for smokers willing to set a quit date. NRT was also offered to heavier smokers.

Hennrikus 2002 was a cluster randomized study in workplaces that compared the provision of telephone counselling, a group format programme, or a choice of programme format.

Rodgers 2005 tested an intervention using text messages to mobile phones to deliver individually tailored support. There was voice contact during the baseline interview when a quit date was negotiated, but since the remainder of the intervention period did not include voice contact it is considered separately to the voice based counselling trials.

METHODOLOGICAL QUALITY

All studies described treatment allocation as random, but few gave sufficient details about the method for generating and concealing the allocation sequence to judge the quality of concealment. Only six reported sufficient detail to be classified as adequate (Abdullah 2005; Aveyard 2003; Gilbert 2006; Katz 2004; Miller 1997; Rodgers 2005; Smith 2004). Concealment was judged to be potentially inadequate in four cases (MacLeod 2003; Mermelstein

2003; Orleans 1998; Zhu 1996) In two of these, allocation was based on the digits of a phone number (Orleans 1998; Zhu 1996). Because of the small number of studies with clear information, not all of which contributed to a meta-analysis, we did not conduct any sensitivity analyses based on quality of concealment.

Six trials used cluster randomization, only one of which contributed to a meta-analysis. In this, households were the unit of randomization, and about 54% of households contained more than one smoker (Lichtenstein 2000). The reported intra-class correlation was small enough to be ignored, but exclusion of the study did not alter the significance of any meta-analysis. The other five were not included in a meta-analysis. In one, participants were given access to a hotline according to county of residence so that the availability of a hotline could be advertised in the intervention counties (Ossip-Klein 1991), another randomized four workplaces to each of six conditions, (Hennrikus 2002); the third randomized groups attending the same cessation course (Mermelstein 2003). The other two randomized clinics to different organisational support systems (Katz 2004; Roski 2003).

In 24 trials (An 2006; Borland 2001; Borland 2003; Emmons 2005; Gilbert 2006; Hollis 2005; Lichtenstein 2000; Lipkus 1999; MacLeod 2003; McFall 1993; Mermelstein 2003; Ockene 1991; Orleans 1998; Osinubi 2003; Ossip-Klein 1997; Prochaska 1993; Prochaska 2001; Rabiuis 2004; Rimer 1994; Roski 2003; Smith 2004; Solomon 2005; Swan 2003; Zhu 2002) no biochemical validation was attempted. In two of these, confirmation of self-reported cessation was sought from 'significant others' (Ossip-Klein 1997; Prochaska 1993). One trial validated some reports at an early follow up but not later (Stotts 2002). Of those trials which used biochemical testing for some or all reported quitters, not all clearly reported validated quit rates, but none reported significantly different misreport or refusal rates between intervention and control conditions. One trial in teens reported high (45-55%) misreport rates in both groups; some admitted smoking in the seven days before returning the sample (Lipkus 2004). In a second trial in teens, not included in any meta-analysis, there was a trend towards greater misreporting in the control group (Rodgers 2005).

Many trials reported both short-term point prevalence (seven day or 24 hour) abstinence and sustained abstinence, at one or more follow ups. Long-term sustained abstinence, or abstinence at one or more previous follow ups is used as the outcome for all trials except Abdullah 2005; Brandon 2000; Brown 1992; Emmons 2005; McFall 1993; Mermelstein 2003; Ockene 1991; Orleans 1998; Ossip-Klein 1997; Reid 1999; Rimer 1994; Stotts 2002. Length of longest follow up ranged from six months (Abdullah 2005; Ockene 1991; Orleans 1998 (12 month follow up not reported for entire sample); Ossip-Klein 1997; Solomon 2000; Swan 2003), to 12 months post-partum (McBride 2004). One trial reported both self-reported continuous abstinence and validated seven day abstinence (Abdullah 2005). We used the validated outcome; this gave a larger effect favouring the intervention group. We include one

trial based on preliminary 12 month data for 75% of the original cohort (Rimer 1994).

RESULTS

1. Trials providing access to a helpline

In one trial, provision of a hotline was associated with an increase in quit rates from 4.0% amongst smokers sent self-help materials only, to 6.6% amongst smokers in areas where an advertised hotline was provided in addition to materials (Ossip-Klein 1991). This difference was statistically significant using the unit of allocation (the county) as the unit of analysis. In a second trial, smokers who had enrolled for materials for a self-help programme with a televised component were randomized to receive follow-up newsletters and access to a helpline for six months. Although the intervention combined a helpline and written materials, quit rates were lower in the intervention than control condition after 24 months. The difference was not significant (McFall 1993). (Results displayed but not pooled in Comparison 01.01).

2. Trials of interventions for people calling helplines

Two studies compared different reactive support during a single session for smokers who called a helpline. They failed to detect a significantly increased benefit from either counselling and materials designed for African-Americans (Orleans 1998) or stage-based counselling designed for blue-collar workers (Thompson 1993) compared to standard support. Quit rates in these trials were from 15% to 20% for point prevalence rates at six months. In the first of these trials, extended follow up for early enrollers found some evidence that quit rates were higher after 12 months in the experimental group. We failed to detect an effect when pooling the studies (N = 1804, odds ratio [OR] 1.12, 95% confidence interval [CI] 0.84 to 1.50; Comparison 02.01).

Eight studies that compared additional proactive calls to provision of materials or brief counselling at a single call showed evidence of a benefit from the additional support, consistent across all studies, despite moderate heterogeneity ($I^2 = 58\%$). The pooled OR was 1.41, (N = 18,468, 95% CI 1.27 to 1.57; Comparison 03.01). Excluding the two unpublished studies (Hollis 2005; Rabiuis 2004) did not alter the conclusion of benefit. In the main analysis we pooled more than one intensity of intervention into the treatment arms of three studies (Hollis 2005; Smith 2004; Zhu 1996). Using only the more intensive interventions in the two trials for which separate data were available (Hollis 2005, Zhu 1996) marginally increased the pooled effect size. In the third trial (Smith 2004) no difference was detected between groups receiving two and six follow-up calls after an initial 50 minute session, and results were not reported separately. Using only the Hollis trial data for intervention and control arms without nicotine replacement therapy (NRT) also had minimal impact on the pooled effect. Direct comparison between the more and less intensive interventions tested in two trials showed marginally significant differences in favour

of the more intensive intervention in both (Zhu 1996, OR 1.36, 95% CI 1.01 to 1.83; Hollis 2005, OR 1.22, 95% CI 1.01 to 1.49).

3 Trials of proactive counselling, not initiated by calls to quitlines

There was moderate heterogeneity between the results of the 29 trials (one contributing different data to two subgroups making a total of 30 in the analysis) ($I^2 = 52\%$) and the pooled effect suggested a modest benefit of counselling (N = 17,467, OR 1.33, 95% 1.21 to 1.47; Comparison 04.01). Our prespecified categories based on the intensity of support common to the control and intervention groups did not explain the heterogeneity, and it was not reduced by excluding the trials amongst teenagers or pregnant women. In the subgroup of 19 trials where the telephone counselling was the main component the pooled effect was similar but with slightly more evidence of heterogeneity ($I^2 = 64\%$). In the group of four trials (Brown 1992; McBride 2004; part of Ockene 1991; Osinubi 2003), where the telephone support followed on from a brief face-to-face intervention, the non-significant point estimate was consistent with the effect size in the other subgroups and there was low heterogeneity ($I^2 = 9\%$, N = 1337, OR 1.31, 95% CI 0.95 to 1.81). In the seven trials (Fiore 2004; Lando 1997; MacLeod 2003; part of Ockene 1991; Reid 1999; Solomon 2000; Solomon 2005) where counselling was used as an adjunct to the systematic use or offer of NRT, there was a marginally significant effect with low heterogeneity ($I^2 = 12\%$, N = 3326, OR 1.28, 95% CI 1.06 to 1.54).

We concluded that these subgroups were not especially helpful in investigating differences in effect between trials. Although we had expected that the relative effect of the telephone component might be less when used as follow up to face-to-face advice or counselling, the amount of behavioural support common to both experimental and control groups was relatively limited in all cases, and it was difficult to categorize some trials.

The effect of counselling intensity

A second subgroup analysis explored the impact of the number of calls, using three categories; two or fewer sessions; three to six sessions, or seven or more. We initially analysed these categories within the grouping by control condition used above, but since the pattern of results was consistent we pooled the results for all 29 trials.

There were seven trials in the lowest intensity category. Fiore 2004, Lando 1992, Lichtenstein 2000, Lipkus 1999, Ossip-Klein 1997, Rimer 1994 and Stotts 2002 all provided one or two calls. There was limited heterogeneity ($I^2 = 32\%$) and no significant effect detected (N = 4225, OR 1.00, 95% CI 0.80 to 1.24). Nineteen trials offered between three and six sessions. There was low to moderate heterogeneity ($I^2 = 42\%$) and a significant effect showing a modest benefit of counselling (N = 11,877, OR 1.38, 95% CI 1.23 to 1.55). Three trials had seven or more sessions (Solomon 2000 did not specify a set number of calls, but the average provided

was seven). There was heterogeneity ($I^2 = 61\%$) because of the large and significant effect of An 2006, but pooling the two other studies alone (Solomon 2000; Solomon 2005) also showed a significant benefit, suggesting effectiveness of this intensity of intervention but uncertainty about the likely size. We had no strong a priori rationale for the choice of cut points, although the 1-2 call group predominantly captured trials with 'brief' interventions. Because the categories were not prespecified we also conducted a meta-regression analysis in STATA 8.2 using the maximum number of planned calls for each study as a measure of intensity. The meta-regression model showed an association between intensity and effect size ($P = 0.01$) with estimates given by the following equation: $\log(\text{OR}) = -0.062 + (0.0779 * \text{intensity})$.

We also considered whether including the seven trials conducted amongst quitline callers would alter these conclusions. This confirmed the benefit of more intensive interventions. Two of the quitline trials included a test of a brief intervention, and when these were included in the one- or two-session categories the estimate just reached significance, although the relative effect was small. One of these trials offered a single session lasting 50 minutes (Zhu 1996) and the other a session of 30 to 40 minutes followed by a second briefer call, with tailored self-help materials (Hollis 2005). These were considerably longer than the sessions used in the other trials, suggesting that their results might not be generalizable to interventions with a small number of short calls.

The effect of motivation

A third subgroup analysis explored the effect of motivation. Ten studies specifically recruited smokers who wanted to make a quit attempt, including all the studies where pharmacotherapy was part of the baseline support. In this group there was evidence of moderate heterogeneity ($I^2 = 59\%$) but a clearly significant benefit of the counselling, (N = 5092, OR 1.64, 95% CI 1.41 to 1.92). Amongst the subgroup of studies where participants were not specifically selected for motivation, although relatively high proportions may have been interested in quitting, there was low heterogeneity ($I^2 = 34\%$) and the effect was both clinically small and marginally significant (N = 12,375, OR 1.15, 95% CI 1.05 to 1.35).

4. Other studies

Seven other studies were judged too dissimilar for pooling. Miller 1997 compared a hospital-based intervention followed by a single call with an intensive intervention in which patients could receive up to four calls after discharge from hospital. The more intensive intervention increased the continuous one-year quit rate from 14% to 19%, a difference which just reached statistical significance ($P = 0.05$). Swan 2003 compared two intensities of behavioural support as an adjunct to bupropion. This study found a significant benefit of the Free & Clear programme which offered a telephone assessment and counselling intervention with four brief prescheduled follow-up calls, compared to the Zyban Advantage Plan which included a single scripted call (N = 1524, OR 1.46,

95% CI 1.17 to 1.82). These two studies provide further evidence that higher numbers of calls are associated with greater benefit. Mermelstein 2003 compared two different counselling protocols for smokers who had completed a group cessation course. No overall benefit was detected for the enhanced condition (OR 0.99 95% CI 0.72 to 1.36) but the authors reported an interaction with gender suggesting that men benefited from the enhanced condition more than from the non-specific support.

Two studies evaluated systems level interventions for changing the organization of care for smoking cessation, with telephone counselling being the main method for providing cessation support. One study failed to detect any benefit of introducing a smoker registry and referral system on cessation rates (Roski 2003). Few of the smokers surveyed at the participating clinics reported using any counselling services, and only 25 to 30% of eligible smokers were estimated to have been referred. One study (Katz 2004) that tested an intervention to implement clinical practice guideline recommendations including the offer of telephone counselling and/or NRT showed a significant increase in sustained abstinence at six months (10.9% versus 3.8%, adjusted OR 3.4, 95% CI 1.8 to 6.3).

Hennrikus 2002 compared offering telephone counselling or group programmes or a choice in a workplace setting. Programmes were offered three times, and the primary evaluation was based on all smokers irrespective of participation. No difference in six-month sustained quit rates was detected at 24 month follow up, although point prevalence quit rates favoured the telephone condition. Quit rates for programme participants were also similar. Incentives increased participation but did not appear to increase cessation rates.

One trial of text messaging (Rodgers 2005) did not detect a significant differences at six months in continuous lapse-free abstinence, but the difference in sustained abstinence allowing for up to three lapses was significant. Large and significant differences in point prevalence abstinence at six and 12 weeks disappeared due to increasing point prevalence abstinence rates in the control group. Interpretation of the results was hampered by differential loss to follow up and the possibility that control group participants were over-reporting abstinence.

DISCUSSION

This review considers telephone services for delivering behavioural counselling and support both proactively and reactively. Interventions studied in trials range from brief contact with the potential to motivate a quit attempt to intensive support for smokers already intending to quit. In updating the review in 2006 we have rearranged a number of the comparisons in order to distinguish between differences in the way in which telephone services were delivered in trials, and the populations that were recruited.

The updated review continues to provide support for proactive telephone counselling for smokers who initiate contact with quitlines. Compared to smokers who have only a single contact with the quitline, and are either sent self-help materials or receive brief counselling or both, those who are randomized to one or more additional calls increase their odds of quitting by about 50%. In two trials increasing the number of calls from two or fewer to more than two increased the benefit. In a secondary analysis we considered the likely absolute increase in quit rates attributable to the additional counselling. In this group of seven trials the definitions of abstinence were relatively similar, with six following up at around 12 months, and six requiring abstinence that has been sustained from at least one earlier follow up. None used biochemical validation. The quit rate in the control groups ranged from 1.5% (Smith 2004) to 12%, or 17% when free nicotine replacement therapy (NRT) was also offered (Hollis 2005). The intervention group quit rates ranged from 5% (Smith 2004) to 14%, or 21% when NRT was offered (Hollis 2005). Despite the variation in baseline quit rates, pooling trial outcomes expressed as risk differences showed no evidence of heterogeneity, and the estimated absolute increase in quit rates was 3% (95% CI 2% to 4%). The most recently published trial (Gilbert 2006) was the only one in which quit rates were not higher in the intervention group. Including this trial increased the statistical heterogeneity between odds ratios (ORs) from 51% to 58%. Although this does not exclude there being a common effect, there were differences in the counselling approach and schedule compared to that used by, for example, the California investigators (Zhu 1996; Zhu 2002). The trial used the Quitline[®], a UK national service. Counsellors were not always able to reach participants before their quit attempt, and provided nonstructured client-driven support. Structured, problem-based counselling before a quit date may be an important feature of an effective intervention.

In the group of studies that recruited participants other than quitline callers there was some evidence of heterogeneity, which was not fully explained by the amount of support common to both intervention and control groups. In most cases this consisted of mailed self-help materials but a small number of trials included brief face-to-face advice and a few offered pharmacotherapy to all participants. In further analysis, two factors seemed to have some influence; the intensity or dose of the intervention, and the motivation of the participants. A meta-regression showed a significant relationship between larger effect size and increasing number of calls. This analysis used the maximum possible number of calls as the measure of intervention intensity. Alternative measures include the average number of calls delivered, which is generally considerably lower than the number intended, and the total contact time. These process measures are less consistently reported. Unless there were particular problems with contacting participants, the planned number of calls is probably a reasonable measure of the 'dose' of support provided for those who were receptive to the intervention.

Indirect comparison between trials also suggested a larger benefit amongst trials that selected smokers who were interested in making a quit attempt. The effect also reached significance amongst the group of trials that did not specifically select motivated smokers, but the estimated size of effect was smaller. Some trials in this subgroup found significant and clinically useful effects and this may reflect the fact that their participants were more interested in quitting, although not selected on this basis. Based on this analysis, cold calling smokers who have not shown a recent interest in quitting or responded to an offer of help may not be effective enough to be a good use of resources. Targeting smokers who want to know more about quitting or are actively making an attempt is a better use of counselling effort.

In previous versions of this review we failed to detect an effect of telephone counselling as an adjunct to face-to-face advice or pharmacotherapy. In the updated analysis, pooling of trials of telephone support as an adjunct to pharmacotherapy detects a small benefit, and we have placed less emphasis on subgroups defined by the nature of the baseline support, and considered instead the intensity of the intervention and the nature of the population targeted. The use of multiple subgroup analyses raises the possibility of spurious results, although the findings of a dose response and more evidence of a larger effect amongst more motivated populations has face validity.

Rigorous evaluation of reactive services (quitlines, hotlines or helplines) has been difficult because of a reluctance to undertake randomized trials that would require callers who sought help to be refused support. This review restricted formal inclusion to randomized or quasi-randomized trials. A single large trial provides the main evidence that hotlines are beneficial (Ossip-Klein 1991). In this study use of the hotline was relatively high: 36% of the intervention participants called the hotline for recorded messages of support, and 8.7% spoke to counsellors. The hotline appeared most effective for those people who enrolled face-to-face, despite the fact that telephone enrollees made more use of the service. There is much more evidence about the benefit of counselling once smokers have called a telephone-based service. One study was able to evaluate the impact of the proactive counselling element of a helpline by capitalising on the constraints on capacity at certain times (Zhu 2002).

Moving beyond the evidence from randomized trials, there have been a number of evaluations that followed up callers to quitlines. In Scotland a follow up of a random sample of callers to the Smokeline service in 1992/3 estimated a quit rate of 23.6% one year later, with 8.2% (SD 2.2%) having been nonsmokers for at least 80% of the intervening period (Platt 1997). They also estimated that almost 6% of the smokers in the country had called during the year. A follow up of 378 callers to the Quit Information Line in Victoria, Australia in 1987 found a quit rate of 17% three to four months after the call (Borland 1989). Also in Australia, an evaluation of a campaign including a helpline (providing

self-help materials, and access to counselling) estimated the point prevalence abstinence rate as 29% at one year amongst callers, with 11% quit for at least 80% of the year (Wakefield 1999). It was estimated that about 3.6% of the adult smokers called the quitline during the year, and there was a 5% sustained quit rate in amongst a cohort followed up after a year (Miller 2003). In England in 1994 a one-year follow up of Quitline callers who spoke to a counsellor estimated their quit rate to be 15.6% (95% confidence interval (CI) 12.7% to 18.9%) (Owen 2000). This Quitline receives approximately half a million calls a year, or around 4% of the adult smoking population. About 54% of callers speak to a counsellor. The evaluation followed a mass media campaign with components aimed at 16- to 24-year-old smokers. A more recent evaluation compared the profile of Quitline callers with the general population of smokers and with clinic attendees. The age distribution of quitline callers was more similar to the general population than of clinic attendees, who were predominantly over 35. The Quitline attracted a higher proportion of younger smokers and women than in the population, (Gilbert 2006). In Sweden 12 month quit rates of around 27% for callers to a reactive quitline and rates as high as 34% for women receiving proactive support have been reported (Helgason 2004). A quitline in Hong Kong attracted relatively more smokers who were younger, female and higher educated, and found self-reported quit rates of 12% after six months (Abdullah 2004). The California Smokers Helpline also reported encouraging long term quit rates and usage levels (Zhu 2000), in addition to the randomized evaluations included here (Zhu 1996; Zhu 2002). Although estimates of reaching 4% to 6% of the smoking population over a year are encouraging, they are likely to be at the upper end of what can be expected, even with the help of mass media campaigns. A recent estimate of usage of established US quitlines was that 1.1% to 1.7% of adult smokers called a quitline over the course of a year (Ossip-Klein 2003), and this level of use may be more typical.

Quitlines may exert an impact beyond that which can be measured by quit rates amongst callers. They may have a symbolic role, emphasising the importance of smoking cessation (Wakefield 2000), and may increase the number of smokers making a quit attempt each year because of awareness generated by the campaigns to promote them (Ossip-Klein 2003).

Promotion of quitlines by mass media antismoking campaigns helps to attract callers, and this may include specific minority or underserved groups by using targeted advertising (Cummings 1989; Cummings 1993; Owen 2000; Pierce 1992; Zhu 2000), but higher educated white women are over-represented as users of telephone services for health care in general (McBride 1999a). Of the quitline studies in this review one was targeted at blue collar workers (Thompson 1993) and one at African Americans (Orleans 1998). The trials in pregnant women, another potential target group, were not conducted in a quitline setting. There are a number of models for quitlines, using various methods to provide initial support for callers and pass them to specialist coun-

sellors where requested and available (Ossip-Klein 2003). Callers do not necessarily ask for or want counselling, and services can increase population quitting just by mailing self-help materials, even though the effect of this minimal intervention may not be large (Lancaster 2005b). Using the telephone contact to collect sufficient data to provide tailored materials may be a useful strategy for enhancing the effect of self-help materials (Borland 2004; Lancaster 2005b). One strategy that has been used in a pilot project for increasing access to treatment for underserved populations is to provide a cellular phone, allowing smokers to receive proactive counselling (Lazev 2004). Using text messaging to provide tailored support has also shown encouraging short-term results (Rodgers 2005).

Telephone-based services can provide support for users of medications such as NRT, or bupropion. One trial in this review (Fiore 2004) tested the Committed Quitters[®] programme as an adjunct to free nicotine patch therapy, but did not detect an additional benefit of the single counselling call even though this was supported by tailored self-help materials. One short-term randomized trial (Shiffman 2000) failed to detect an effect of a single telephone call after the target quit date compared to mailed, tailored self-help materials alone for purchasers of nicotine gum. In both trials the lack of effect may be attributed to the insufficient dose of the telephone component. Another trial compared multiple to single calls for users of bupropion, and there was a clear benefit of the four call protocol (Swan 2003). Support provided by pharmaceutical companies may also be underused. In their trial of proactive calls as an adjunct to nicotine patch, Lando and colleagues noted that less than 1% of participants called the company helpline, whether they were scheduled to receive calls or simply encouraged to call the helpline themselves (Lando 1997). It may be possible to use brief proactive calls to encourage use of quitline services (Boyle 2004b; Holtrop 2005).

Telephone counselling may also have a role in increasing the appropriate use of pharmacotherapy. In a trial with one of the largest significant effects, part may be attributable to the greater use of pharmacotherapy amongst those receiving counselling even though NRT and bupropion were also available in the usual care condition (An 2006). Increased use of pharmacotherapy was also noted in the intervention groups in Emmons 2005. A study of callers to the California Smokers' Helpline provides useful information about the acceptability of a telephone referral service as an adjunct to pharmacotherapy (Zhu 2000a). Participants in this follow-up study all planned to use NRT and had a pre-quit counselling session. Those who chose to receive further counselling were more likely to attempt to quit, and to remain nonsmokers for up to a year. Seventy-nine per cent of participants continued with counselling, and 26% of these stayed quit for a year. Of the 21% who had only a single session of counselling, 16% quit. More than half the smokers had called the helpline as a requirement for obtaining free NRT, and the high take up of further behavioural support

suggests that it was popular as an adjunct to pharmacotherapy.

Telephone-based support systems are increasingly available. The US Department of Health & Human Services has introduced a single national quitline number allowing access to the National Network of Tobacco Cessation Quitlines (Anon 2005). Other countries where national or state quitlines are known to be established include Australia (Miller 2003), New Zealand (Wilson 2005), United Kingdom (Gilbert 2006), Sweden (Helgason 2004) and Hong Kong (Abdullah 2005). The data in this review support the continued provision and development of these services.

AUTHORS' CONCLUSIONS

Implications for practice

Proactive telephone counselling helps smokers interested in quitting. There is evidence of a dose response; one- or two-call protocols are less likely to provide a measurable benefit. Three or more calls increase the odds of quitting compared to a minimal intervention such as providing standard self-help materials, brief advice, or compared to pharmacotherapy. Telephone quitlines provide an important route of access to support for smokers, and call-back counselling enhances their usefulness.

Implications for research

Further research on ways to combine face-to-face counselling with telephone follow up to support quit attempts and reduce relapse rates may be useful. Research on reactive helpline services which compares different counselling protocols and different schedules of call-back sessions may also lead to improved outcomes.

POTENTIAL CONFLICT OF INTEREST

None known.

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REFERENCES

References to studies included in this review

Abdullah 2005 *{published data only}*

Abdullah ASM, Lam TH, Mak YW, Loke AY. A randomized control trial of a smoking cessation intervention on parents of young children- a preliminary report (POS2-011). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.

* Abdullah ASM, Mak YW, Loke AY, Lam TH. Smoking cessation intervention in parents of young children: a randomised controlled trial. *Addiction* 2005;**100**:1731–40.

An 2006 *{published data only}*

An LC, Partin M, Zhu SH, Arikian NJ, Nelson DB, Nugent SM, et al. Delivery of bupropion SR as part of a telephone counseling intervention for veteran smokers (POS1-040). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.

An LC, Zhu SH, Arikian NJ, Nelson DB, Nugent SM, Partin M, et al. Telestop: a randomized trial of increased access to behavioral and pharmacological therapy for smoking cessation (abstract). *Nicotine & Tobacco Research* 2005;**7**(4):689.

* An LC, Zhu S-H, Nelson DB, Arikian NJ, Nugent S, Partin MR, et al. Benefits of telephone care over primary care for smoking cessation. *Archives of Internal Medicine* 2006;**166**:536–42.

Aveyard 2003 *{published data only}*

Aveyard P, Griffin C, Lawrence T, Cheng KK. A controlled trial of an expert system and self-help manual intervention based on the stages of change versus standard self-help materials in smoking cessation. *Addiction* 2003;**98**(3):345–54.

Borland 2001 *{published data only}*

Borland R, Segan CJ, Livingston PM, Owen N. The effectiveness of callback counselling for smoking cessation: a randomized trial. *Addiction* 2001;**96**:881–9.

Borland 2003 *{published data only}*

* Borland R, Balmford J, Segan C, Livingston P, Owen N. The effectiveness of personalized smoking cessation strategies for callers to a Quitline service. *Addiction* 2003;**98**(6):837–46.

Brown 1992 *{published data only}*

Brown S, Hunt G, Owen N. The effect of adding telephone contact to self-instructional smoking-cessation materials. *Behavior Change* 1992;**9**:216–22.

Curry 1995 *{published data only}*

Britt J, Curry SJ, McBride C, Grothaus LC, Louie D. Implementation and acceptance of outreach telephone counseling for smoking cessation with nonvolunteer smokers. *Health Education Quarterly* 1994;**21**:55–68.

* Curry SJ, McBride C, Grothaus LC, Louie D, Wagner EH. A randomized trial of self-help materials, personalized feedback, and telephone counselling with nonvolunteer smokers. *Journal of Consulting and Clinical Psychology* 1995;**63**:1005–1014.

Emmons 2005 *{published data only}*

Emmons KM, Puleo E, Park E, Gritz ER, Butterfield RM, Weeks JC, et al. Peer-delivered smoking counseling for Childhood Cancer Survivors increases rate of cessation: The Partnership for Health Study. *Journal of Clinical Oncology* 2005;**23**:6516–23.

Fiore 2004 *{published data only}*

Fiore MC, McCarthy DE, Jackson TC, Zehner ME, Jorenby DE, Mielke M, et al. Integrating smoking cessation treatment into primary care: An effectiveness study. *Preventive Medicine* 2004;**38**(4):412–20.

Gilbert 2006 *{published data only}*

Gilbert H, Sutton S. Does adding tailored feedback to telephone counselling improve quit rates? (POS1-033). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.

* Gilbert H, Sutton S. Evaluating the effectiveness of proactive telephone counselling for smoking cessation in a randomized controlled trial. *Addiction* 2006;**101**:590–8.

Hennrikus 2002 *{published data only}*

Hennrikus DJ, Jeffery RW, Lando HA, Murray DM, Brelje K, Daviddann B, et al. The SUCCESS Project: The effect of program format and incentives on participation and cessation in worksite smoking cessation programs. *American Journal of Public Health* 2002;**92**:274–9.

Hollis 2005 *{published and unpublished data}*

Hollis J, Fellows J, Aickin M, Riedlinger K, McAfee T, Zbikowski S, et al. Efficacy of six state-level tobacco quitline interventions (POS1-023). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.

* Hollis J, McAfee T, Stark M, Fellows J, Zbikowski S, Riedlinger K. One-year outcomes for six Oregon tobacco Quitline interventions. *Annals of Behavioral Medicine* 2005;**29** Suppl:S056.

- Katz 2004** *{published data only}*
Katz DA, Muehlenbruch DR, Brown RL, Fiore MC, Baker TB. Effectiveness of implementing the agency for healthcare research and quality smoking cessation clinical practice guideline: a randomized, controlled trial. *Journal of the National Cancer Institute* 2004;**96**(8): 594–603.
- Lando 1992** *{published data only}*
* Lando HA, Hellerstedt WL, Pirie PL, McGovern PG. Brief supportive telephone outreach as a recruitment and intervention strategy for smoking cessation. *American Journal of Public Health* 1992;**82**: 41–6.
- Lando 1997** *{published data only}*
* Lando HA, Rolnick S, Klevan D, Roski J, Cherney L, Lauger G. Telephone support as an adjunct to transdermal nicotine in smoking cessation. *American Journal of Public Health* 1997;**87**:1670–4.

Rolnick SJ, Klevan D, Cherney L, Lando HA. Nicotine replacement therapy in a group model HMO. *HMO Practice* 1997;**11**:34–7.
- Lichtenstein 2000** *{published data only}*
Lee ME, Lichtenstein E, Andrews JA, Glasgow RE, Hampson SE. Radon-smoking synergy: A population-based behavioral risk reduction approach. *Preventive Medicine* 1999;**29**:222–7.

* Lichtenstein E, Andrews JA, Lee ME, Glasgow RE, Hampson SE. Using radon risk to motivate smoking reduction: evaluation of written materials and brief telephone counselling. *Tobacco Control* 2000; **9**:320–6.
- Lipkus 1999** *{published data only}*
* Lipkus IM, Lyna PR, Rimer BK. Using tailored interventions to enhance smoking cessation among African-Americans at a community health center. *Nicotine & Tobacco Research* 1999;**1**:77–85.
- Lipkus 2004** *{published data only}*
Lipkus IM, McBride CM, Pollak KI, Schwartz-Bloom RD, Tilson E, Bloom PN. A randomized trial comparing the effects of self-help materials and proactive telephone counseling on teen smoking cessation. *Health Psychology* 2004;**23**:397–406.
- MacLeod 2003** *{published data only}*
Macleod ZR, Charles MA, Arnaldi VC, Adams IM. Telephone counselling as an adjunct to nicotine patches in smoking cessation: a randomised controlled trial. *Medical Journal of Australia* 2003;**179**:349–52.
- McBride 1999a** *{published data only}*
* McBride CM, Scholes D, Grothaus LC, Curry SJ, Ludman E, Albright J. Evaluation of a minimal self-help smoking cessation intervention following cervical cancer screening. *Preventive Medicine* 1999;**29**:133–8.
- McBride 1999b** *{published data only}*
Lando HA, Valanis BG, Lichtenstein E, Curry SJ, McBride CM, Pirie PL, et al. Promoting smoking abstinence in pregnant and postpartum patients: a comparison of 2 approaches. *American Journal of Managed Care* 2001;**7**:685–93.

McBride CM, Curry SJ, Lando HA, Pirie PL, Grothaus LC, Nelson JC. Prevention of relapse in women who quit smoking during pregnancy. *American Journal of Public Health* 1999;**89**:706–11.
- McBride 2004** *{published data only}*
McBride CM, Baucom DH, Peterson BL, Pollak KI, Palmer C, Westman E, et al. Prenatal and postpartum smoking abstinence - A partner-assisted approach. *American Journal of Preventive Medicine* 2004; **27**:232–8.
- McClure 2005** *{unpublished data only}*
McClure J, Wetter D, Curry SJ. Acceptability of proactive contact and counseling among female smokers. *Nicotine & Tobacco Research* 2004;**6**(4):722.

* McClure JB, Westbrook E, Curry SJ, Wetter DW. Proactive, motivationally enhanced smoking cessation counseling among women with elevated cervical cancer risk. *Nicotine & Tobacco Research* 2005; **7**:881–9.
- McFall 1993** *{published data only}*
* McFall SL, Michener A, Rubin D, Flay BR, Mermelstein RJ, Burton D, et al. The effects and use of maintenance newsletters in a smoking cessation intervention. *Addictive Behavior* 1993;**18**:151–8.
- Mermelstein 2003** *{published data only}*
Mermelstein R, Hedeker D, Wong SC. Extended telephone counseling for smoking cessation: does content matter?. *Journal of Consulting and Clinical Psychology* 2003;**71**:565–74.
- Miguez 2002** *{published data only}*
Miguez MC, Vazquez FL, Becona E. Effectiveness of telephone contact as an adjunct to a self-help program for smoking cessation: a randomized controlled trial in Spanish smokers. *Addictive Behaviors* 2002;**27**:139–44.
- Miller 1997** *{published data only}*
* Miller NH, Smith PM, DeBusk RF, Sobel DS, Taylor CB. Smoking cessation in hospitalized patients - Results of a randomized trial. *Archives of Internal Medicine* 1997;**157**:409–15.
- Ockene 1991** *{published data only}*
* Ockene JK, Kristeller J, Goldberg R, Amick TL, Pekow PS, Hosmer D, et al. Increasing the efficacy of physician-delivered smoking interventions: a randomized clinical trial. *Journal of General Internal Medicine* 1991;**6**:1–8. [MedLine: 91154925].

Ockene JK, Kristeller J, Pbert L, Hebert JR, Luippold R, Goldberg RJ, et al. The physician-delivered smoking intervention project: can short-term interventions produce long-term effects for a general outpatient population?. *Health Psychology* 1994;**13**:278–81. [MedLine: 94333279].
- Orleans 1991** *{published data only}*
* Orleans CT, Schoenbach VJ, Wagner EH, Quade D, Salmon MA, Pearson DC, et al. Self-help quit smoking interventions: effects of self-help materials, social support instructions, and telephone counseling. *Journal of Consulting and Clinical Psychology* 1991;**59**:439–48. [MedLine: 91302578].

Schoenbach VJ, Orleans CT, Wagner EH, Quade D, Salmon MA, Porter CQ. Characteristics of smokers who enroll and quit in self-help programs. *Health Education Research* 1992;**7**:369–80.
- Orleans 1998** *{published data only}*
Orleans CT, Boyd NR, Bingle R, Sutton C, Fairclough D, Heller D, et al. A self-help intervention for African American smokers: tailoring cancer information service counseling for a special population. *Preventive Medicine* 1998;**27**(5):S61–S70. [MedLine: 99030559].
- Osinubi 2003** *{published data only}*
Osinubi OY, Moline J, Rovner E, Sinha S, Perez-Lugo M, Demissie K, et al. A pilot study of telephone-based smoking cessation interven-

- tion in asbestos workers. *Journal of Occupational and Environmental Medicine* 2003;**45**(5):569–74.
- Ossip-Klein 1991** *{published data only}*
 * Ossip Klein DJ, Giovino GA, Megahed N, Black PM, Emont SL, Stiggins J, et al. Effects of a smoker's hotline: results of a 10-county self-help trial. *Journal of Consulting and Clinical Psychology* 1991;**59**:325–32. [MedLine: 91231574].
- Ossip-Klein 1997** *{published data only}*
 Ossip Klein DJ, Carosella AM, Krusch DA. Self-help interventions for older smokers. *Tobacco Control* 1997;**6**:188–93. [MedLine: 98057889].
- Prochaska 1993** *{published and unpublished data}*
 * Prochaska JO, Di Clemente CC, Velicer WF, Rossi JS. Standardized, individualized, interactive, and personalized self-help programs for smoking cessation. *Health Psychology* 1993;**12**(5):399–405. [MedLine: 94038821].
- Prochaska 2001** *{published data only}*
 Prochaska JO, Velicer WF, Fava JL, Ruggiero L, Laforge RG, Rossi JS, et al. Counselor and stimulus control enhancements of a stage-matched expert system intervention for smokers in a managed care setting. *Preventive Medicine* 2001;**32**(1):23–32. [MedLine: 21107533].
- Rabius 2004** *{published data only}*
 McAlister AL, Rabius V, Geiger A, Glynn TJ, Huang P, Todd R. Telephone assistance for smoking cessation: one year cost effectiveness estimations. *Tobacco Control* 2004;**13**(1):85–6.
 * Rabius V, McAlister AL, Geiger A, Huang P, Todd R. Telephone counseling increases cessation rates among young adult smokers. *Health Psychology* 2004;**23**(5):539–41.
- Reid 1999** *{published data only}*
 D'Angelo MES, Reid RD, Brown KS, Pipe AL. Gender differences in predictors for long-term smoking cessation following physician advice and nicotine replacement therapy. *Canadian Journal of Public Health* 2001;**92**:418–22.
 * Reid RD, Pipe A, D'Angelo WA. Is telephone counselling a useful addition to physician advice and nicotine replacement therapy in helping patients to stop smoking? A randomized controlled trial. *Canadian Medical Association Journal* 1999;**160**:1577–81. [MedLine: 99302229].
- Rimer 1994** *{published data only}*
 Rimer BK, Orleans CT, Fleisher L, Cristinzio S. Does tailoring matter? The impact of a tailored guide on ratings and short-term smoking-related outcomes for older smokers. *Health Education Research* 1994;**9**:69–84.
- Rodgers 2005** *{published data only}*
 Bramley D, Riddell T, Whittaker R, Corbett T, Lin RB, Wills M, et al. Smoking cessation using mobile phone text messaging is as effective in Maori as non-Maori. *New Zealand Medical Journal* 2005;**118**(1216):U1494.
 * Rodgers A, Corbett T, Bramley D, Riddell T, Wills M, Lin RB, et al. Do u smoke after txt? Results of a randomised trial of smoking cessation using mobile phone text messaging. *Tobacco Control* 2005;**14**:255–61.
- Roski 2003** *{published data only}*
 Roski J, Jeddeloh R, An L, Lando H, Hannan P, Hall C, et al. The impact of financial incentives and a patient registry on preventive care quality: increasing provider adherence to evidence-based smoking cessation practice guidelines. *Preventive Medicine* 2003;**36**(3):291–9.
- Smith 2004** *{published data only}*
 Smith PM, Cameron R, McDonald PW, Kawash B, Madill C, Brown KS. Telephone counseling for population-based smoking cessation. *American Journal of Health Behavior* 2004;**28**(3):231–41.
 Smith PM, Cameron R, Payne B, Madill C, McDonald P, Brown S. Randomised controlled trial of a telephone smoking cessation program: effect of 3 vs 7 calls. 11th World Conference on Tobacco or Health 6-11 August 2000, Chicago, Illinois. 2000; Vol. 1.
- Solomon 2000** *{published data only}*
 Solomon LJ, Scharoun GM, Flynn BS, Secker-Walker RH, Sepinwall D. Free nicotine patches plus proactive telephone peer support to help low-income women stop smoking. *Preventive Medicine* 2000;**31**:68–74. [MedLine: 20357504].
- Solomon 2005** *{published data only}*
 * Solomon LJ, Marcy TW, Howe KD, Skelly JM, Reinier K, Flynn BS. Does extended proactive telephone support increase smoking cessation among low-income women using nicotine patches?. *Preventive Medicine* 2005;**40**(3):306–13.
- Stotts 2002** *{published data only}*
 Stotts AL, Diclemente CC, Dolan-Mullen P. One-to-one - A motivational intervention for resistant pregnant smokers. *Addictive Behaviors* 2002;**27**(2):275–92.
- Swan 2003** *{published data only}*
 Jack LM, Swan GE, Thompson E, Curry SJ, McAfee T, Dacey S, et al. Bupropion SR and smoking cessation in actual practice: methods for recruitment, screening, and exclusion for a field trial in a managed-care setting. *Preventive Medicine* 2003;**36**(5):585–93.
 Javitz HS, Swan GE, Zbikowski SM, Curry SJ, McAfee TA, Decker DL, et al. Cost-effectiveness of different combinations of bupropion SR dose and behavioral treatment for smoking cessation: a societal perspective. *American Journal of Managed Care* 2004;**10**(3):217–26.
 McAfee T, Zbikowski SM, Bush T, McClure J, Swan G, Jack LM, et al. The effectiveness of bupropion SR and phone counseling for light and heavy smokers (PA2-1). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.
 Swan GE, Jack LM, Curry S, Chorost M, Javitz H, McAfee T, et al. Bupropion SR and counseling for smoking cessation in actual practice: Predictors of outcome. *Nicotine & Tobacco Research* 2003;**5**:911–21.
 Swan GE, Javitz HS, Jack LM, Curry SJ, McAfee T. Heterogeneity in 12-month outcome among female and male smokers. *Addiction* 2004;**99**(2):237–50.
 * Swan GE, McAfee T, Curry SJ, Jack LM, Javitz H, Dacey S, et al. Effectiveness of bupropion sustained release for smoking cessation in a health care setting: a randomized trial. *Archives of Internal Medicine* 2003;**163**:2337–44.

Thompson 1993 {published data only}

Kinne S, Thompson B, Wooldridge JA. Response to a telephone smoking information line. *American Journal of Health Promotion* 1991;**5**:410–3.

* Thompson B, Kinne S, Lewis FM, Wooldridge JA. Randomized telephone smoking-intervention trial initially directed at blue-collar workers. *Journal of the National Cancer Institute. Monographs* 1993;**14**:105–12.

Zhu 1996 {published data only}

* Zhu SH, Stretch V, Balabanis M, Rosbrook BP, Sadler G, Pierce JP. Telephone counseling for smoking cessation - effects of single-session and multiple-session interventions. *Journal of Consulting and Clinical Psychology* 1996;**64**:202–11. [MedLine: 97063232].

Zhu 2002 {published data only}

Zhu SH, Anderson CM, Tedeschi GJ, Rosbrook B, Johnson CE, Byrd M, et al. Evidence of real-world effectiveness of a telephone quitline for smokers. *New England Journal of Medicine* 2002;**347**(14):1087–93. [MedLine: 22249313].

References to studies excluded from this review**Ahijevych 1995**

* Ahijevych K, Wewers ME. Low-intensity smoking cessation intervention among African-American women cigarette smokers - a pilot study. *American Journal of Health Promotion* 1995;**9**:337–9.

Amos 1995

* Amos A, White DA, Elton RA. Is a telephone helpline of value to the workplace smoker?. *Occupational Medicine* 1995;**45**:234–8.

Balanda 1999

* Balanda KP, Lowe JB, O'Connor Fleming ML. Comparison of two self-help smoking cessation booklets. *Tobacco Control* 1999;**8**:57–61.

Best 1977

* Best JA, Bass F, Owen LE. Mode of service delivery in a smoking cessation program for public health. *Canadian Journal of Public Health* 1977;**68**(6):469–73.

Bliksrud 2002

Bliksrud T, Nygaard E. [Telephone Quitline and changed smoking behavior] [Norwegian]. *Tidsskrift for den Norske Laegeforening* 2002;**122**(27):2616–8.

Borland 1989

Borland R. Three-month follow-up on callers to a telephone counselling service in 1987. *Quit Evaluation Studies: Volume 3 Chapter 6* www.quit.org.au (accessed 18 July 2000) 1989.

Borland 2004

Borland R, Balmford J, Hunt D. The effectiveness of personally tailored computer-generated advice letters for smoking cessation. *Addiction* 2004;**99**(3):369–77.

Boyle 2004b

Boyle RG, Pronk NP, Enstad CJ. A randomized trial of telephone counseling with adult moist snuff users. *American Journal of Health Behavior* 2004;**28**(4):347–51.

Brandon 2000

* Brandon TH, Collins BN, Juliano LM, Lavee AB. Preventing relapse among former smokers: A comparison of minimal interventions through telephone and mail. *Journal of Consulting and Clinical Psychology* 2000;**68**:103–13. [MedLine: 20176180].

Buchanan 2004

Buchanan LM, El Banna M, White A, Moses S, Siedlik C, Wood M. An exploratory study of multicomponent treatment intervention for tobacco dependency. *Journal of Nursing Scholarship* 2004;**36**:324–30.

Conway 2004

Conway TL, Woodruff SI, Edwards CC, Elder JP, Hurtado SL, Hervig LK. Operation Stay Quit: evaluation of two smoking relapse prevention strategies for women after involuntary cessation during US Navy recruit training. *Military Medicine* 2004;**169**(3):236–42.

Cummings 1988

Cummings KM, Emont SL, Jaen C, Sciandra R. Format and quitting instructions as factors influencing the impact of a self-administered quit smoking program. *Health Education Quarterly* 1988;**15**:199–216.

Jaen CR, Cummings KM, Zielezny M, O'Shea R. Patterns and predictors of smoking cessation among users of a telephone hotline. *Public Health Reports* 1993;**108**:772–8.

Cummings 1989

* Cummings KM, Sciandra R, Davis S, Rimer B. Response to anti-smoking campaign aimed at mothers with young children. *Health Education Research* 1989;**4**:429–37.

Curry 2003

Curry SJ, Ludman EJ, Graham E, Stout J, Grothaus L, Lozano P. Pediatric-based smoking cessation intervention for low-income women: a randomized trial. *Archives of Pediatrics and Adolescent Medicine* 2003;**157**(3):295–302.

Davis 1992

* Davis SW, Cummings KM, Rimer BK, Sciandra R. The impact of tailored self-help smoking cessation guides on young mothers. *Health Educ Quarterly* 1992;**19**:495–504.

Daza 2005

Daza P, Nguyen L, Mazas C, Mejia C, Wetter D. Smoking cessation among hispanic smoker: ¡dijos al fumar! (POS3-065). Society for Research on Nicotine and Tobacco 11th Annual Meeting March 20–23, Prague. Czech Republic. 2005.

DeBusk 1994

* DeBusk RF, Miller NH, Superko HR, Dennis CA, Thomas RJ, Lew HT, et al. A case-management system for coronary risk factor modification after acute myocardial infarction. *Annals of Internal Medicine* 1994;**120**(9):721–9.

Decker 1989

* Decker BD, Evans RG. Efficacy of a minimal contact version of a multimodal smoking cessation program. *Addictive Behaviors* 1989;**14**:487–91.

Dubren 1977

* Dubren R. Self-reinforcement by recorded telephone messages to maintain non-smoking behavior. *Journal of Consulting and Clinical Psychology* 1977;**45**:358–60.

Hasuo 2004

Hasuo S, Tanaka H, Oshima A. [Efficacy of a smoking relapse prevention program by postdischarge telephone contacts: a randomized trial] [Japanese]. *Nippon Kosbu Eisei Zasshi [Japanese Journal of Public Health]* 2004;**51**(6):403–12.

Holtrop 2005

Holtrop JS, Wadland WC, Vansen S, Weismantel D, Fadel H. Recruiting health plan members receiving pharmacotherapy into smoking cessation counseling. *American Journal of Managed Care* 2005; **11**:501–7.

Johnson 1999

* Johnson JL, Budz B, Mackay M, Miller C. Evaluation of a nurse-delivered smoking cessation intervention for hospitalized patients with cardiac disease. *Heart & Lung* 1999; **28**:55–64.

Koffman 1998

Koffman DM, Lee JW, Hopp JW, Emont SL. The impact of including incentives and competition in a workplace smoking cessation program on quit rates. *American Journal of Health Promotion* 1998; **13**:105–11.

Lando 1996

* Lando HA, Pirie PL, Roski J, McGovern PG, Schmid LA. Promoting abstinence among relapsed chronic smokers: The effect of telephone support. *American Journal of Public Health* 1996; **86**:1786–90.

Leed Kelly 1996

Bobo JK, McIlvain HE, Lando HA, Walker RD, Leed Kelly A. Effect of smoking cessation counseling on recovery from alcoholism: findings from a randomized community intervention trial. *Addiction* 1998; **93**:877–87.

* Leed Kelly A, Russell KS, Bobo JK, McIlvain H. Feasibility of smoking cessation counseling by phone with alcohol treatment center graduates. *Journal of Substance Abuse Treatment* 1996; **13**:203–10.

Lichtenstein 2002b

Lichtenstein E, Lee ME, Boles SM, Foster L, Hampson SE. Using radon risk to motivate smoking reduction: replication and extension (PO3 21). Society for Research on Nicotine and Tobacco 8th Annual Meeting February 20–23 Savannah, Georgia. 2002.

Manfredi 1999

* Manfredi C, Crittenden KS, Warnecke R, Engler J, Cho YI, Shaligram C. Evaluation of a motivational smoking cessation intervention for women in public health clinics. *Preventive Medicine* 1999; **28**:51–60.

McBride 2002

McBride CM, Bepko G, Lipkus IM, Lyna P, Samsa G, Albright J, et al. Incorporating genetic susceptibility feedback into a smoking cessation program for African-American smokers with low income. *Cancer Epidemiology, Biomarkers and Prevention* 2002; **11**(6):521–8.

Ockene 1992

Ockene JK, Kristeller J, Goldberg R, Ockene IS, Merriam P, Barrett S, et al. Smoking cessation and severity of disease: The coronary artery smoking intervention study. *Health Psychology* 1992; **11**:119–26.

Owen 2000

Owen L. Impact of a telephone helpline for smokers who called during a mass media campaign. *Tobacco Control* 2000; **9**:148–54.

Platt 1997

* Platt S, Tannahill A, Watson J, Fraser E. Effectiveness of antismoking telephone helpline: Follow up survey. *BMJ* 1997; **314**:1371–5.

Prue 1983

* Prue DM, Davis CJ, Martin JE, Moss RA. An investigation of a minimal contact brand fading program for smoking treatment. *Addictive Behaviors* 1983; **8**:307–10.

Racelis 1998

Racelis MC, Lombardo K, Verdin J. Impact of telephone reinforcement of risk reduction education on patient compliance. *Journal of Vascular Nursing* 1998; **16**(1):16–20.

Ratner 2004

Bottomoff JL, Johnson JL, Moffat B, Fofonoff D, Budz B, Groening M. Synchronizing clinician engagement and client motivation in telephone counseling. *Qualitative Health Research* 2004; **14**:462–77.

* Ratner PA, Johnson JL, Richardson CG, Bottomoff JL, Moffat B, Mackay M, et al. Efficacy of a smoking-cessation intervention for elective-surgical patients. *Research in Nursing and Health* 2004; **27**(3): 148–61.

Reid 1999b

* Reid RD, Pipe AL. A telephone-based support program for over-the-counter nicotine patch users. *Canadian Journal of Public Health* 1999; **90**:397–8.

Ringen 2002

Ringen K, Anderson N, McAfee T, Zbikowski SM, Fales D. Smoking cessation in a blue-collar population: results from an evidence-based pilot program. *American Journal of Industrial Medicine* 2002; **42**(5): 367–77.

Schneider 1995

* Schneider SJ, Schwartz MD, Fast J. Computerized, telephone-based health promotion. I: Smoking cessation program. *Computers and Human Behavior* 1995; **11**:135–48.

Shiffman 2000

Shiffman S, Paty JA, Rohay JM, Dimarino ME, Gitchell J. The efficacy of computer-tailored smoking cessation material as a supplement to nicotine polacrilex gum therapy. *Archives of Internal Medicine* 2000; **160**:1675–81.

Simon 1997

* Simon JA, Solkowitz SN, Carmody TP, Browner WS. Smoking cessation after surgery - A randomized trial. *Archives of Internal Medicine* 1997; **157**:1371–6.

Simon 2003

Simon JA, Carmody TP, Hudes ES, Snyder E, Murray J. Intensive smoking cessation counseling versus minimal counseling among hospitalized smokers treated with transdermal nicotine replacement: a randomized trial. *American Journal of Medicine* 2003; **114**:555–62.

Sivarajan 2004

Sivarajan Froelicher ES, Miller NH, Christopherson DJ, Martin K, Parker KM, Amonetti M, et al. High rates of sustained smoking cessation in women hospitalized with cardiovascular disease: the Women's Initiative for Nonsmoking (WINS). *Circulation* 2004; **109**(5):587–93.

Stevens 1993

Stevens VJ, Glasgow RE, Hollis JE, Lichtenstein E, Vogt TM. A smoking-cessation intervention for hospital patients. *Medical Care* 1993; **31**(1):65–72.

Taylor 1990

Taylor CB, Houston-Miller N, Killen JD, DeBusk RF. Smoking cessation after acute myocardial infarction: effects of a nurse-managed intervention. *Annals of Internal Medicine* 1990; **113**:118–23. [Med-Line: 1990297441].

Terazawa 2001

Terazawa T, Mamiya T, Masui S, Nakamura M. [The effect of smoking cessation counseling at health checkup] [Japanese]. *Sangyo Eiseigaku Zasshi* 2001;**43**(6):207–13.

Urso 2003

Urso PP. Augmenting tobacco cessation treatment outcomes with telephone-delivered interventions. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 2003;**64**(5-B):2133.

Wadland 1999

Wadland WC, Stoffelmayr B, Berger E, Crombach A, Ives K. Enhancing smoking cessation rates in primary care. *Journal of Family Practice* 1999;**48**(9):711–8.

Wadland 2001

Wadland WC, Stoffelmayr B, Ives K. Enhancing smoking cessation of low-income smokers in managed care. *Journal of Family Practice* 2001;**50**(2):138–44.

Westman 1993

* Westman EC, Levin ED, Rose JE. The nicotine patch in smoking cessation. A randomized trial with telephone counseling. *Archives of Internal Medicine* 1993;**153**:1917–23.

Zhu 2000a

Zhu SH, Rosbrook B, Anderson C, Tedeschi GJ, Gutierrez E, Johnson C, et al. Use of nicotine patch and its effects for smokers calling a statewide telephone counseling helpline. *Nicotine & Tobacco Research* 1999;**1**(1):113.

Zhu SH, Tedeschi GJ, Anderson CM, Rosbrook B, Byrd M, Johnson CE, et al. Telephone counseling as adjuvant treatment for nicotine replacement therapy in a “Real-World” setting. *Preventive Medicine* 2000;**31**:357–63.

References to studies awaiting assessment**Boyle 2004a**

Boyle R, Solberg LI, Pronk N, Enstad CJ, Boucher J, Asche S. Offering telephone counseling to smokers using pharmacotherapy (POS1-034). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.

Halpin 2005

Halpin HA, McMenamin S, Rideout J, Boyce-Smith G. The effectiveness and costs of different benefit designs for treating tobacco dependence. Results from a randomized trial. Society for Research on Nicotine and Tobacco 11th Annual Meeting March 20-23, Prague, Czech Republic. 2005.

Rabius 2005

Rabius V, Pike J, Geiger AT, McAlister AL. Telephone counseling for smoking cessation; effects of number and duration of counseling sessions and NRT use (PA2-3). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.

Rabius V, Villars P, Pike J, Geiger AT, Hunter J, McAlister AL. Depression and other factors in cost-effective tailoring of telephone counseling. National Conference on Tobacco or Health May 4-6, Chicago, Ill. 2005.

Velicer 2002

Velicer W, Fava J, Prochaska JO, Ward R, Cottrill S, Friedman R, Ramelson HZ, Keller S, Robins A, Gulliver S. Evaluating the effec-

tiveness of NRT therapy in a population: preliminary outcome (20 months) (PA2-6). Society for Research on Nicotine and Tobacco 8th Annual Meeting February 20-23 Savannah, Georgia. 2002.

Zhu 2004

Zhu SH, Cummins S, Anderson C, Tedeschi G, Rosbrook B, Gutierrez-Terrell E. Telephone intervention for pregnant smokers: a randomized trial (POS1-110). Society for Research on Nicotine and Tobacco 10th Annual Meeting February 18-21, Phoenix, Arizona. 2004.

Additional references**Anon 2005**

Anon. HHS 'Quitline' helps Americans stop smoking. *FDA Consumer* 2005;**39**:4–5.

Burke 1993

Burke A. Examining the use of a fully-automated interactive voice response tobacco cessation support line. *American Journal of Health Promotion* 1993;**8**:93–4, 100.

Cummings 1993

Cummings KM, Sciandra R, Davis S, Rimer BK. Results of an anti-smoking media campaign utilizing the Cancer Information Service. *National Cancer Institute. Monographs* 1993;**14**:113–8.

Glasgow 1991

Glasgow RE, Hollis JF, McRae SG, Lando HA. Providing an integrated program of low intensity tobacco cessation services in a health maintenance organization. *Health Education Research* 1991;**6**:87–9.

Greenland 1985

Greenland S, Robins J. Estimation of a common effect parameter from sparse followup data. *Biometrics* 1985;**41**:55–68.

Grimshaw 2005

Grimshaw G, Stanton A, Lancaster T. Tobacco cessation interventions for young people (Protocol). In: *The Cochrane Database of Systematic Reviews*, 3, 2005.

Hajek 2005

Hajek P, Stead LF, West R, Jarvis M, Lancaster T. Relapse prevention interventions for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 1, 2005.

Helgason 2004

Helgason AR, Tomson T, Lund KE, Galanti R, Ahnve S, Gilljam H. Factors related to abstinence in a telephone helpline for smoking cessation. *European Journal of Public Health* 2004;**14**(3):306–10.

Higgins 2003

Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ* 2003;**7414**:557–60.

Lancaster 2004

Lancaster T, Stead LF. Physician advice for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 4, 2004.

Lancaster 2005a

Lancaster T, Stead LF. Individual behavioural counselling for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 2, 2005.

Lancaster 2005b

Lancaster T, Stead LF. Self-help interventions for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 3, 2005.

Lazev 2004

Lazev A, Vidrine D, Arduino R, Gritz E. Increasing access to smoking cessation treatment in a low-income, HIV-positive population: the feasibility of using cellular telephones. *Nicotine & Tobacco Research* 2004;**6**:281–6.

Lichtenstein 1996

Lichtenstein E, Glasgow RE, Lando HA, Ossip Klein DJ, Boles SM. Telephone counseling for smoking cessation - rationales and meta-analytic review of evidence. *Health Education Research* 1996;**11**:243–57.

Lichtenstein 2002a

Lichtenstein E. The effectiveness of telephone counseling for smoking cessation. Society for Research on Nicotine and Tobacco 4th European Conference Snatander, Spain, October 3-5. 2002.

Lumley 2004

Lumley J, Oliver SS, Chamberlain C, Oakley L. Interventions for promoting smoking cessation in pregnancy. In: *The Cochrane Database of Systematic Reviews*, 4, 2004.

McBride 1999c

McBride CM, Rimer BK. Using the telephone to improve health behavior and health service delivery. *Patient Education and Counseling* 1999;**37**:3–18.

Miller 2003

Miller CL, Wakefield M, Roberts L. Uptake and effectiveness of the Australian telephone Quitline service in the context of a mass media campaign. *Tobacco Control* 2003;**12** Suppl 2:ii53–ii58.

Ossip-Klein 2003

Ossip-Klein DJ, McIntosh S. Quitlines in North America: Evidence base and applications. *American Journal of the Medical Sciences* 2003;**326**(4):201–5.

Pierce 1992

Pierce JP, Anderson DM, Romano RM, Meissner HI, Odenkirchen JC. Promoting smoking cessation in the United States: Effect of public service announcements on the Cancer Information Service telephone line. *Journal of the National Cancer Institute* 1992;**84**:677–83.

Ramelson 1999

Ramelson HZ, Friedman RH, Ockene JK. An automated telephone-based smoking cessation education and counseling system. *Patient Education and Counseling* 1999;**36**:131–44.

Stead 2005

Stead LF, Lancaster T. Group behaviour therapy programmes for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 2, 2005.

Wakefield 1999

Wakefield M, Miller C. Evaluation of the National Quitline Service. In: Commonwealth Department of Health and Aged Care, editor (s). *Australia's National Tobacco Campaign: Evaluation Report Volume 1*. Canberra: CDHAC, Commonwealth of Australia. www.health.gov.au/pubhlth/publicat/document/metadata/tobccamp.htm, 1999: 83–106.

Wakefield 2000

Wakefield M, Borland R. Saved by the bell: the role of telephone helpline services in the context of mass-media anti-smoking campaigns. *Tobacco Control* 2000;**9**:117–9.

Wilson 2005

Wilson N, Thomas G, Grigg M, Afzal R. New smoke-free environments legislation stimulates calls to a national Quitline. *Tobacco Control* 2005;**14**:287–8.

Yusuf 1985

Yusuf S, Peto R, Lewis J, Collins R, Sleight P. Beta blockade during and after myocardial infarction: an overview of the randomized trials. *Progress in Cardiovascular Diseases* 1985;**27**(5):335–71.

Zhu 2000

Zhu SH, Anderson CM, Johnson CE, Tedeschi G, Roeseler A. A centralised telephone service for tobacco cessation: the California experience. *Tobacco Control* 2000;**9** (Suppl 2):ii48–ii55.

References to other published versions of this review**Stead 2001**

Stead LF, Lancaster T. Telephone counselling for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 2, 2001.

Stead 2003

Stead LF, Lancaster T. Telephone counselling for smoking cessation. In: *The Cochrane Database of Systematic Reviews*, 1, 2003.

* Indicates the major publication for the study

T A B L E S**Characteristics of included studies**

Study	Abdullah 2005
Methods	Country: Hong Kong Setting: Parents of children in a birth cohort study Recruitment: by mail, current smokers Randomization: numbered sealed opaque envelope, sequence generation not described
Participants	903 current smokers with young children (49 recent quitters not included here)

Telephone counselling for smoking cessation (Review)

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Characteristics of included studies (Continued)

	84% M, >50% aged 36-45, 91% smoked ≤ 20/day
Interventions	1. Single mailing of stage-matched S-H (either preparation/action or contemplation/precontemplation) 2. As 1, plus 20-30 mins of TC at time of enrollment by trained nurse counsellor. Hotline number, further counselling at 1m & 3m
Outcomes	Abstinence at 6m, validated 7 day PP. (Unvalidated self-reported continuous abstinence also reported). Validation: CO <9ppm or urine cotinine <100 mmol/mol
Notes	New for 2006 update Effect on self-reported continuous abstinence was non-significant Average duration of counselling 38 min over 3 contacts
Allocation concealment	A – Adequate

Study An 2006

Methods	Country: USA Setting: 5 veterans administration medical centres Recruitment: by mail, planning to quit in next 30 days Randomization: method not stated
Participants	821 smokers interested in quitting (excludes 16 deaths, 1 withdrawal) 91% M, av. age 57, av. cigs/day 26. 26% had > 7d abstinence in prev year, 44% ever use bupropion, 82% ever use NRT
Interventions	1. Mailed S-H and standard care; opportunity for intervention during routine health care and referral to individual or group cessation programmes. NRT & bupropion avail on formulary 2. As 1, plus proactive TC, modified California helpline protocol, 7 calls, relapse sensitive schedule. NRT & bupropion available, could be mailed directly after screening & primary provider approval for bupropion
Outcomes	Abstinence at 12m (sustained from 6m, 7 day PP also reported) Validation: none
Notes	New for 2006 update TC increased use of pharmacotherapies. Effect greater for sustained quitting than point prevalence. 72% completed 3 or more calls. Mean (SD) 7.7 (4.1) including courtesy calls, relapses, repeat attempts. Mean (SD) duration of total contact 123 (71) min.
Allocation concealment	B – Unclear

Study Aveyard 2003

Methods	Country: UK Setting: 65 general practices Recruitment: volunteers from random selection of smoking patients, not selected for motivation Randomization: centralised, minimization to balance SoC, addiction and SES
Participants	2471 smokers, 2058 in relevant arms, >80% in precontemplation or contemplation, 10-14% in preparation. 54% F, av. age 41, av. cigs/day 20
Interventions	1. Standard S-H materials, single mailing 2. S-H manual based on Transtheoretical model, expert system letter tailored on baseline questionnaire. Further questionnaires at 3m & 6m for additional letters (approx 50% received 3 letters). 3. As 2, plus proactive TC after receipt of each questionnaire (max 3 calls). Designed as reminders, scripted, delivered by trained postgraduate students.
Outcomes	Abstinence at 12m, (reported sustained for 6m) Validation: saliva cotinine < 14.2 ng/ml
Notes	New for 2006 update 3 vs 2, effect of calls. Sensitivity analysis 3 vs 2+1. 66% received 1st phone call, 36% 2nd, 31% 3rd.

Characteristics of included studies (Continued)

Allocation concealment A – Adequate

Study	Borland 2001
Methods	Country: Australia Setting: community Recruitment: callers to a quitline Randomization: method not stated
Participants	998 smokers interested in quitting, 52% F, 37% aged 15-29, 26% aged 30-39, av. cigs/day 23
Interventions	1. Proactive callback TC following initial call to quitline: Multiple calls, first pre-quit, quit, then according to need. Up to 6m. Mailed materials 2. Control: Mailed materials Both groups also received the standard motivational counselling in response to their first call.
Outcomes	Abstinence at 12m (sustained for 9m) Validation: none
Notes	Average number of calls 2.8, 67% received 1 or more. 20% refused call back or wanted to initiate the calls, further 7% did not receive any. Denominators based on Ns randomized
Allocation concealment	B – Unclear

Study	Borland 2003
Methods	Country: Australia Setting: community Recruitment: callers to a quitline Randomization: by shuffling questionnaires, states that biases could not arise
Participants	1578 smokers, 54% F, modal age 30-49, av. cigs/day 23
Interventions	1. Standard S-H Quit pack based around SoC 2. Additional tailored letters at baseline, and at 3m & 6m based on mailed assessments 3. As 2, plus proactive cognitive behavioural stage-base TC, calls at negotiated times, ~10-15 mins. Usually over 2-3 wks, could extend further. Some participants in all groups received brief reactive counselling before enrollment
Outcomes	Abstinence at 12m (sustained for 9m) Validation: none
Notes	New for 2006 update. 3 vs 2, effect of calls. Sensitivity analysis 3 vs 2+1 68% received calls, av. 4.8 for those receiving any, 23% received >=7.
Allocation concealment	B – Unclear

Study	Brown 1992
Methods	Country: Australia Setting: Community health centre Recruitment: advertising for smokers interested in cessation Randomization: method not stated
Participants	45 smokers attending an information evening on smoking cessation 62% F, av. age 40, av. cigs/day 23
Interventions	1. S-H manual 2. S-H manual and proactive TC; 6 calls at 1,2,4,6,8,10 wks which asked about use of manual, and gave additional information about any techniques or skills proving difficult

Characteristics of included studies (Continued)

Outcomes	Abstinence at 12m (7 day PP) Validation: Saliva samples collected but not apparently tested - 1 participant refusing to provide a sample was classified as smoking.
Notes	2 vs 1, effect of TC compared to S-H and single information session alone
Allocation concealment	B – Unclear

Study Curry 1995

Methods	Country: USA Setting: Health Maintenance Organization Recruitment: Smokers identified via a telephone survey of health behaviour in a random sample of HMO members Randomization: method not stated
Participants	1137 smokers, 479 in relevant arms, not selected by motivation to quit 52% F, av. age 41, av. cigs/day 17
Interventions	1. Control - no materials or counselling 2. S-H booklet (Breaking Away) 3. As 2, plus feedback based on computer analysis of initial survey. 4. As 3, plus proactive TC; up to 3 calls at 2, 6, 10 wks
Outcomes	Abstinence at 12m, from 3m-12m Validation: saliva cotinine requested but not obtained for all self-reported quitters. Disconfirmation rates (cut off >20ng/ml) not significantly different between groups.
Notes	4 vs 3, effect of TC compared to S-H and feedback alone Over two thirds completed 3 calls, rates did not differ by SoC
Allocation concealment	B – Unclear

Study Emmons 2005

Methods	Country: USA Setting: Childhood Cancer Survivors Study cohort Recruitment: Smokers contacted via telephone to assess eligibility and enrol. Randomization: method not stated
Participants	794 smokers, not selected for motivation to quit (excludes 2 deaths in control) 47% F, av. age 31, av. cigs/day 12
Interventions	1. S-H control. Mailed manual (Clearing the Air) & letter from study physician 2. Peer counselling. Up to 6 calls in 7m period, by trained cancer survivor. Motivational, tailored to SoC. Free NRT available. Individually tailored materials before 1st call & other materials during intervention.
Outcomes	Abstinence at 12m (7 day PP) Validation: none (warning that samples might be requested)
Notes	New for 2006 update 2 vs 1, effect of TC compared to S-H alone. No data on average number of calls;
Allocation concealment	B – Unclear

Study Fiore 2004

Methods	Country: USA Setting: Primary care patients, 16 clinics Recruitment: Clinic attenders willing to accept treatment Randomization: method not stated
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Characteristics of included studies (Continued)

Participants	961 smokers of ≥ 10 cigs/day. (643 in relevant arms, a further 908 were allowed to select treatment. Demographic details based on 1869) 58% F, av. age 40, av. cigs/day 22
Interventions	(Self-selected group of factorial trial not included in meta-analysis) 1. Nicotine patch, 22mg, 8 wks incl tapering. 2. As 1, plus Committed Quitters programme, single TC session and tailored S-H. 3. As 2, plus individual counselling, 4 x 15-25 min sessions, pre-quit, -TQD, next 2 wks (not used in this review)
Outcomes	Continuous abstinence at 1 yr (no relapse lasting 7 days, also PP) Validation: CO, cut off not specified. 2 discordant
Notes	New for 2006 update. 2 vs 1 69% of those randomized to group 2 enrolled in CQ programme
Allocation concealment	B – Unclear

Study **Gilbert 2006**

Methods	Country: UK Setting: community Recruitment: quitline callers who engaged in counselling Randomization: pseudo random by day of week, recruiters blind so concealment judged adequate
Participants	1457 smokers planning quit attempt within 2 wks 66% F, av. age 39, av. cigs/day NS
Interventions	1. Standard QUIT information pack & counselling at initial contact. 2. As 1, plus offered 5 proactive calls, starting TQD if possible, 2 in wk 1, 1 in wks 2 & 4. Client centred.
Outcomes	Abstinence at 12m (sustained for 6m, also PP) Validation: none
Notes	New for 2006 update 26% received no additional calls, 42% had 4+ calls, 31% had 1-3 calls
Allocation concealment	A – Adequate

Study **Hennrikus 2002**

Methods	Country: USA Setting: 24 worksites Recruitment: Baseline survey used to identify smokers. Randomization: cluster randomized by company, 4/condition. method not stated
Participants	2402 smokers at baseline survey. 38-48% in precontemplation. 50-64% F, av age 36-40 (large between-company variations in prevalence and smoker characteristics).
Interventions	Factorial design, 6 conditions: Incentives for participation and cessation/no incentive crossed with telephone, group or choice of programme format. Telephone counselling: 3-6 sessions + mailed ALA S-H materials. Group therapy: 13 sessions. Each programme offered 3 times over approx 18m
Outcomes	Abstinence at 24m, sustained for 6m & 7 day PP Validation: saliva cotinine from a sample. No correction for misreporting
Notes	Cluster randomized, and no other trial compared TC to group so not used in meta-analysis, reported narratively
Allocation concealment	B – Unclear

Characteristics of included studies (Continued)

Study	Hollis 2005
Methods	Country: USA Setting: community, Oregon Recruitment: callers to a quitline Randomization: method not stated
Participants	4500 smokers willing to make a quit attempt
Interventions	Factorial design; 3 levels of counselling, +/- offer of nicotine patch 1. Brief counselling (usual care), 15 min + referral information & tailored S-H 2. Moderate TC: 30-40 min motivational interview, brief call to encourage use of community services, tailored S-H. 3. As 2, plus offer of 5 further calls (Free & Clear)
Outcomes	Abstinence >30 days at 12m Validation: none
Notes	New for 2006 update based on an abstract 2&3 combined vs 1 in main analysis
Allocation concealment	B – Unclear

Study	Katz 2004
Methods	Country: USA Setting: 8 primary care clinics Recruitment: smokers attending for non emergency visits Randomization: cluster randomized by clinic
Participants	1141 smokers (>1 cig/day) 56% F, age 43/40, median cigs/day 20/15
Interventions	1. Intervention based on AHRQ guidelines. Training in brief advice for intake clinicians, vital signs stamp. Patients willing to set TQD offered proactive TC (2 calls, pre & post TQD) by trained nurse, smokers of over 10 cigs/day offered NRT 2. Control. Information about guidelines, no specific advice on counselling.
Outcomes	Sustained abstinence at 2m & 6m Validation: saliva cotinine. Poor response, similar return & misreport rates. Validated sustained rates not reported.
Notes	New for 2006 update. TC part of a multicomponent intervention, not included in meta-analysis Study also included a baseline assessment. Data from smokers recruited during implementation period used here. 29% used NRT in intervention versus 11% in control.
Allocation concealment	A – Adequate

Study	Lando 1992
Methods	Country: USA Setting: community, Minnesota Recruitment: from 4 groups of previously identified smokers Randomization: method not stated. A random sample of intervention and control participants were followed up.
Participants	1827 smokers, not selected by motivation to quit 50% F, av. age 47, av. cigs/day 22
Interventions	1. Proactive TC, 2 calls over 3 wks. Offered S-H materials 2. No intervention, contacted at follow up only

Characteristics of included studies (Continued)

Outcomes	Abstinence at 18m (no puff, > 3m and validated abstinent at 6m) Validation: Saliva cotinine <10ng/ml at 6m
Notes	1 vs 2, effect of TC vs no intervention High level of cotinine disconfirmation. 70% agreed to second call.
Allocation concealment	B – Unclear

Study Lando 1997

Methods	Country: USA Setting: Health Maintenance Organization Recruitment: physician referral and HMO clinic newsletters Randomization: method not stated. Cluster randomized by orientation session attended; participants did not know condition in advance
Participants	509 smokers of >20 cigs/day, motivated to quit 56% F, av. age 42, av. cigs/day 28
Interventions	All participants received prescriptions for free nicotine patch (Prostep), 22mg for a maximum of 6wks plus 2wks 11mg. Proactive vs Reactive Attended 90 mins group orientation session describing study, use of patch, behavioural information, set quit date. Standard written materials with patch included description of a toll-free telephone help line. 1. No further support 2. Orientation session included encouragement to call toll-free number and a registration card 3. Additional proactive TC, 4 10-15 min calls (approx 1, 4, 7-9, 12 wks from quit date). Reinforced success or negotiated a new quit date
Outcomes	Abstinence at 12m (from quit date) Validation: CO at 6m. 96% of quitters were confirmed.
Notes	3 vs 1+2, effect of proactive TC compared to contact & quitline alone. (1& 2 combined since fewer than 1% called quitline and no difference between quit rates). Participants who did not return questionnaires at 2, 5, 8, 12 wks were called by telephone. Average number of calls completed 3.76
Allocation concealment	B – Unclear

Study Lichtenstein 2000

Methods	Country: USA Setting: community Recruitment: via electric utility mailing to identify households with smokers and low radon concentrations Randomization: by household, method not stated.
Participants	1006 smokers in 714 households (651 in relevant arms) Av. cigs/day 20
Interventions	1. Standard Environmental Protection Agency leaflet on risks of radon (this arm not used in review) 2. Pamphlet highlighting risk of smoking in low concentrations of radon, with tips for quitting, or not smoking indoors 3. Pamphlet as 2, plus up to 2 brief (mean about 6 min) proactive TC sessions
Outcomes	Abstinence at 12m (sustained at 3m, 12m) Validation: none
Notes	3 vs 2, effect of TC versus S-H alone Cluster randomization, 54% of smokers lived with another smoker. Intraclass correlation for sustained abstinence was .010. Analyses did not correct for this. 82% received at least 1 call, 40% more than one. Mean (SD) duration 10.4 (5.4) in for 1st call, 5.8 (4.9) for 2nd.
Allocation concealment	B – Unclear

Characteristics of included studies (Continued)

Study	Lipkus 1999
Methods	Country: USA Setting: Health centre Recruitment: from telephone survey of patients Randomization: method not stated
Participants	266 randomized, 160 followed up, 107 in relevant arms Low income African-American smokers, unselected by motivation 52% F, 49% aged >50
Interventions	1. Physician prompts attached to chart (included other screening tests). Providers trained to use 4As (Ask/ Advise/ Assist/ Arrange follow up) model. Only received if participants visited doctor 2. As 1, plus 1 mailing of tailored print communication around birthday 3. As 2, plus proactive TC; 1 or 2 (for women also due other screening), stage-based, barriers and reasons for quitting, approx 6 mins.
Outcomes	Abstinence 16m after last intervention, 30 day quit Validation: none
Notes	3 vs 2, TC without face-to-face contact; physician advice was not an integral part of the intervention - participants not required to have visited the doctor or received advice during the intervention period. Reported rates based on numbers followed up, not randomized. Provider compliance reported to be 48%
Allocation concealment	B – Unclear

Study	Lipkus 2004
Methods	Country: USA Setting: community Recruitment: proactive in shopping malls Method of randomization: not stated, stratified by SoC
Participants	412 teen smokers (aged 15-18, smoked in past 7 days) 51% F, 56% aged >=17, av cigs/day 10, 21% contemplation
Interventions	1. S-H, 2 booklets for teen smokers & video 2. as 1, plus proactive TC, 3 calls (12-15 mins) using motivational interviewing and problem solving
Outcomes	Abstinence at 8m (7 day at 4m & 8m) Validation method: Saliva cotinine <=10 ng/mL at 4m only. Low response, high failure to confirm. Abstinence based on self-report only
Notes	New for 2006 update TC as adjunct to targeted S-H. 72% received at least 1 call, 52% at least 5, 36% at least 3.
Allocation concealment	B – Unclear

Study	MacLeod 2003
Methods	Country: Australia Setting: community Recruitment: Community volunteers Randomization: shuffling folders
Participants	854 smokers interested in quitting 51% F, av. age 42, av. cigs/day 24
Interventions	1. Free 2 wk supply of nicotine patch by mail, instructed to purchase further supply. 14 or 21 mg depending on body weight. 2. As 1. + 5 proactive TC sessions at 1, 2, 3, 6 & 10 wks. 20 min session 1, 10 min others. Toll-free hotline, S-H materials.

Characteristics of included studies (Continued)

Outcomes	Abstinence at 6m (90 day continuous) Validation: none, warning of CO test only.
Notes	New for 2006 update TC as adjunct to NRT Average number of calls 4.7. 9% of participants called hotline
Allocation concealment	C – Inadequate

Study McBride 1999a

Methods	Country: USA Setting: Health Maintenance Organization Recruitment: health survey of women following a cervical smear (pap) test Randomization: method not stated, stratified on test result
Participants	580 female current smokers, not selected for motivation for quit Av. age 36, av. cigs/day 13
Interventions	1. Usual care - no smoking cessation intervention 2. Mailed cessation kit, letter personalised to stage of change and quit motivation, proactive TC, 3 counselling calls (13-15 min) 2 wks after mailing then monthly. Motivational & stage-based.
Outcomes	Abstinence at 15m (7 day at 6m & 15m) Telephone interview Validation: saliva cotinine <20ng/ml, quit rates not corrected, low level of misreport
Notes	Effect of TC and S-H materials compared to no intervention Counsellor discussed smoking and cervical cancer but not individual's pap results. over 80% received at least one call, 60% all 3.
Allocation concealment	B – Unclear

Study McBride 1999b

Methods	Country: USA Setting: 2 Health Maintenance Organizations Recruitment: pregnant women who had booked a prenatal appointment, by mail Randomization: method not stated
Participants	897 pregnant smokers & recent quitters (44% already quit) not selected for motivation to quit Av. age 28, av. cigs/day 15 before pregnancy, 5 if still smoking
Interventions	1. S-H booklet only 2. Prepartum intervention: 3 proactive TC calls av 8.5 mins, approx 2 wks after S-H mailing, and 1m & 2m later. Tailored letter, S-H book. After 28 wk follow up sent relapse prevention kit. 3. Pre- & Postpartum intervention: as 2, plus 3 calls within first 4m postpartum, av 7.7 mins. 3 newsletters
Outcomes	Abstinence at 12m postpartum (7 day PP) Validation: Saliva cotinine requested by mail, <20ng/mL. Self-reported rates used in analyses, no difference in confirmation rates between groups
Notes	New for 2006 update 3+2 vs 1, effect of TC versus S-H only
Allocation concealment	B – Unclear

Study McBride 2004

Methods	Country: USA Setting: Army Medical Centre Recruitment: women at first prenatal visit Randomization: method not stated, stratified by smoking status
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Characteristics of included studies (Continued)

Participants	583 pregnant female current smokers and recent quitters (390 in relevant arms) Av. age 24
Interventions	1. Usual care - provider advice and S-H guide 2. As 1, plus 6 proactive TC calls, 3 in pregnancy, 3 postpartum within 4m + late pregnancy relapse prevention kit 3. Partner-assisted intervention, not used in this review
Outcomes	Abstinence at 12m postpartum (PP at all 4 follow ups) Validation: Saliva cotinine request, incomplete return, rates based on self report.
Notes	New for 2006 update. Effect of TC as adjunct to brief advice Effect at 6m not sustained longer term. Mean number of calls received 5
Allocation concealment	B – Unclear

Study McClure 2005

Methods	Country: USA Setting: Health Maintenance Organization Recruitment: women with an abnormal cervical smear or colposcopy Randomization: method not stated
Participants	275 female smokers, not selected for motivation to quit Av. age 33, av. cigs/day 14
Interventions	1. Usual care, S-H, contact details for Free & Clear, a covered benefit 2. As 1, plus up to 4 x 15 min proactive TC calls over 6m.
Outcomes	Abstinence at 12m (PP) Validation: Cotinine saliva strip test, but judged over-conservative so self report used. Relative effect not altered
Notes	New for 2006. Effect of TC versus S-H only 82% completed all 4 calls, 90% 3 or 4. Mean duration 16 min
Allocation concealment	B – Unclear

Study McFall 1993

Methods	Country: USA Setting: community Recruitment: Registrants for a S-H TV programme who received manual or watched at least one programme Randomization: method not stated
Participants	1745 smokers 70% F, 23% age 18-30, 40% age 31-45, 30% 45-64
Interventions	Reactive 1. TV programme and S-H manual (ALA 'Freedom From Smoking in 20 Days') 2. As 1, plus 10 newsletters over 6m following programme with details of hotline with taped messages and counsellors
Outcomes	Abstinence at 24m (7 day) Validation: none
Notes	Effect of access to hotline combined with S-H materials for maintenance of cessation. Use of the hotline was low - only 7% called and spoke to a counsellor
Allocation concealment	B – Unclear

Study Mermelstein 2003

Methods	Country: USA
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Characteristics of included studies (Continued)

	Setting: cessation clinic Recruitment: community volunteers Randomization: cluster randomized by group, counsellor blind until final session, not blind during TC intervention
Participants	756 smokers who completed group programme (excludes 15 never reached for follow up) 66% F, av. age 43, av. cigs/day 23
Interventions	All received 7 wk group programme first 1. Tailored proactive TC from counsellor who provided cessation course. 3 weekly then 3-6 alternate wks, 15 min each. Videotapes for initial failures or relapsers 2. Supportive but non-specific proactive counselling calls from counsellor, same schedule.
Outcomes	Abstinence at 15m, 7 day PP Validation: none
Notes	New for 2005 update Compared different content of TC as addition to group programme. Not pooled with any other study.
Allocation concealment	C – Inadequate

Study Miguez 2002

Methods	Setting: Spain Recruitment: Community volunteers Randomization: method not stated
Participants	200 smokers interested in quitting 38% F av. age 35, av cigs/day 28
Interventions	1. Proactive TC, 6 x weekly 10 min calls. 4 on motivation & cessation, 2 on maintenance, + S-H 2. S-H only. Personalized intro letter, manual & 6 similar mailing with self monitoring and self evaluation forms
Outcomes	Abstinence at 12m (not even a puff since quitting) Validation: CO at 12m
Notes	TC as adjunct to S-H
Allocation concealment	B – Unclear

Study Miller 1997

Methods	Country: USA Setting: Hospitals Recruitment: Inpatient smokers (excl those with no intention of quitting, or wishing to quit unaided) Randomization: sealed envelopes. Study undertaken in 2 phases with minimal intervention introduced in phase 2
Participants	1942 smokers (excludes deaths) 49% F, av. age 51, av cigs/day 20
Interventions	All groups received standardized physician advice 1. Intensive intervention: 30 min nurse face-to-face counselling, proactive TC, 4 at 48 hrs post discharge, 7, 21, 90 days, optional session for relapsers 2. Minimal: 30 min counselling + 1 phone call at 48 hrs 3. Usual Care
Outcomes	Abstinence at 12m (sustained at 3m, 6m, 12m) (Paper also reports 12m PP confirmed and self-reported cessation rates) Validation: saliva cotinine <15ng/ml, or family member verification

Characteristics of included studies (Continued)

Notes 1 vs 2, effect of additional telephone follow up. Usual care group not used in meta-analysis. Intensive intervention was significantly better than usual care for confirmed PP 12m abstinence, other differences not significant

Allocation concealment A – Adequate

Study Ockene 1991

Methods Country: USA
Setting: Primary care clinics
Recruitment: clinic attenders
Randomization: method not stated, allocated prior to physician encounter

Participants 1223 smokers (excludes deaths and 237 who did not receive intervention) not selected for interest in quitting
57% F, av. age 35, av. cigs/day 23

Interventions 2x3 factorial design, physician intervention +/- follow-up
(a) AO: Physician advice only
(b) CI: Physician-provided patient-centered counselling, written agreement and schedule follow up, letter.
(c). CI+NCG: as (b), plus informed of availability of free nicotine gum.
1. Follow-up counselling by psychologist or health educator, 3 calls (1, 2, 3m) approx 10 mins, behavioural recommendations. Letters
2. No follow-up

Outcomes Abstinence at 6m (7 day); (3m sustained abstinence rates not given by condition)
Validation: none

Notes 1 vs 2, AO and CI effect of TC in addition to physician intervention. NCG arm in pharmacotherapy adjunct, 12m abstinence rates reported in Ockene 1994 but not given by follow-up condition

Allocation concealment B – Unclear

Study Orleans 1991

Methods Country: USA
Setting: Health Maintenance Organization
Recruitment: Largely through publicity in HMO magazine
Randomization: method not stated, stratified by living alone/not, advice to quit in last 12m/not and nicotine content of cig.brand

Participants 2021 smokers of 3 or more cigs/day, wanting to quit (1412 in relevant arms)
63% F, av. age 44, av. cigs/day 26

Interventions 1. S-H manual, Quit Kit and ALA 'Lifetime of Freedom from Smoking'
2. Same materials as 1, plus 2 copies of a social support guide.
3. Same as 2, plus proactive TC (6, 18, 34, 60 wks) from a counsellor and invitation to call a quit line
4. Control - Referral guide

Outcomes Abstinence at 16m for >6m, by blinded telephone interview.
Validation: Saliva cotinine <10ng/ml, or thiocyanate <2,400 umol/l for gum users.
Self-report rates reported in analyses

Notes 3 vs 1+2, effect of telephone counselling compared to S-H materials alone. (No significant difference between 1 and 2)

Allocation concealment B – Unclear

Study Orleans 1998

Methods Country: USA
Setting: community

Characteristics of included studies (Continued)

	Recruitment: African-American smokers calling the NCIS telephone counselling line in response to targeted campaign Randomization: by last digit of caller's contact phone number
Participants	1422 African-American smokers 64% F, av. age not stated, 62% in 20-39 age group, median cigs/day 20
Interventions	Reactive, for callers to quitline 1. Tailored telephone counselling and tailored 36 page 'Pathways to Freedom' guide. Guide used African-American models and addressed specific obstacles. Personalized quitting plan. 2. Standard NCIS telephone counselling and standard guide 'Clearing the Air'
Outcomes	Abstinence at 6m, 7 day PP. Telephone questionnaire Validation: none (12m abstinence also assessed in sample of 445 smokers and there were significant differences 15.0% vs 8.8% using ITT).
Notes	Comparison of 2 types of counselling. Also included in Cochrane Self-help review since effects of counselling and S-H materials cannot be separated. 63% followed up. No differential drop out, results based on all randomized (ITT). Median call length 19 min (interdecile range 10-28 min) for tailored, 13 min (8-23) for standard
Allocation concealment	C – Inadequate

Study **Osinubi 2003**

Methods	Country: USA Setting: occupational health service, USA Recruitment: asbestos-exposed workers & retirees attending medical screening. Randomization: sealed envelopes, no further details
Participants	58 smokers, not selected for motivation 93% M, av. age 52, av.cigs/day 22
Interventions	All participants received brief physician advice at screening 1. Enrolment in Free & Clear, proactive TC, 5 calls, hotline access, pharmacotherapy available 2. Instructions to obtain support from personal physician, S-H materials & resources
Outcomes	Abstinence at 6m, 30 day PP, telephone Validation: none
Notes	New for 2005 update
Allocation concealment	B – Unclear

Study **Ossip-Klein 1991**

Methods	Country: USA Setting: 10 counties Recruitment: Media advertising, local sign-ons, brochures. Randomization: Matched pairs of counties assigned to condition in a restricted procedure to minimize media spill-over.
Participants	1813 smokers planning to quit within 3m Av. age 43, av. cigs/day 28 Therapists (hotline): ex-smoker counsellors
Interventions	Reactive 1. ALA S-H manuals. 2. as 1, plus materials promoting 24 hr hotline with daytime access to counsellors.

Characteristics of included studies (Continued)

Outcomes	Abstinence at 18m, sustained from 3m. Validation: by significant other for 90% of claims, saliva cotinine for 52% of claims. Cotinine validated rates used.
Notes	The authors report a range of analyses based on alternative measures of smoking status and using logistic regression to allow for cluster randomization. The higher quit rate in the hotline counties was consistent in all analyses. 36% called hotline, 8.7% spoke with counsellors.
Allocation concealment	B – Unclear

Study **Ossip-Klein 1997**

Methods	Country: USA Setting: community Recruitment: Advertising for S-H cessation for over 60 yr olds Randomization: method not stated
Participants	177 smokers aged >=60, planning to quit in next 3m 61% F, av. cigs/day 25
Interventions	1. S-H manual (Clear Horizons), access to 24 hr hotline, 2 letters of support and hotline reminders 2. As 1, plus proactive TC, 2 calls at 4 & 8 wks. Counsellors followed structured format to provide strategies based on SoC.
Outcomes	Abstinence at 6m (7 day PP) Validation: no biochemical. Significant others only. Refusals and nonconfirmations classified as smokers.
Notes	Effect of telephone counselling compared to S-H materials alone 42% had called hotline and 17.5% spoken to counsellor by 6m.
Allocation concealment	B – Unclear

Study **Prochaska 1993**

Methods	Country: USA Setting: community Recruitment: Advertisements for volunteers to test S-H materials Randomization: method not stated, stratified by SoC
Participants	756 smokers (12% precontemplation, 58% contemplation, 30% preparation) (378 in relevant arms) 62% F, av. age 43, av. cigs/day 27
Interventions	1. ALA S-H manuals 2. Tailored manuals - 5 covering precontemplation, contemplation, action, maintenance, relapse. Participants sent manual for their SoC and subsequent ones. 3. Interactive - in addition to tailored manuals, sent personally tailored reports in response to questionnaires 4. Proactive TC - short (15 min) calls at 0, 1m, 3m, 6m. Materials as in 3.
Outcomes	Sustained abstinence at 18m (12m & 18m) Validation: none. Participants asked for names of significant others but these not contacted
Notes	4 vs 3, effect of TC compared to S-H alone. Numbers randomized to groups and quit rates as shown in graphs obtained from authors.
Allocation concealment	B – Unclear

Study **Prochaska 2001**

Methods	Country: USA Setting: Managed care organization Recruitment: Smokers identified by survey of members. 85% recruited to a study Randomization: method not stated
Participants	1447 smokers unselected for motivation to quit (723 in comparisons used). 38% were precontemplators.

Characteristics of included studies (Continued)

	56% F, av. age 38, av. cigs/day 20
Interventions	1. Assessment only (completed questionnaires on 4 occasions) 2. Expert System S-H. Tailored 2-3 page report at 0, 3m, 6m and SoC matched manual 3. As 2, plus proactive TC, short calls at 0, 3m, 6m. Similar to Prochaska 1993 protocol but more emphasis on alternative targets for those unwilling to set quit date. 4. As 3, plus computer scheduled cig reduction.
Outcomes	Abstinence at 18m, sustained for 6m. (Other measures of abstinence also reported) Validation: None
Notes	3 vs 2, TC vs S-H alone. Other arms compared in Self-help review Denominators here include losses to follow up and refusals. Author analysis suggests ITT analysis is biased. Sensitivity analysis does not alter conclusions.
Allocation concealment	B – Unclear

Study Rabius 2004

Methods	Country: USA Setting: community Recruitment: callers to a quitline Randomization: method not specified
Participants	3522 smokers willing to make a quit attempt within 2 wks ($<=25/>25$): 61%/67% F, av.age 22/44, av. cigs/day 24/18
Interventions	1. 3 American Cancer Society S-H booklets 2. As 1, plus offer of 5 proactive TC calls, 2 before TQD, 3 within 2 wks
Outcomes	Abstinence at 6m (sustained). Only people abstinent at 3m followed at 6m. Validation: none for most, small local sample tested (reported in McAlister 2004)
Notes	New for 2006 update
Allocation concealment	B – Unclear

Study Reid 1999

Methods	Country: Canada Setting: community Recruitment: community volunteers Randomization: table of random numbers, stratified by sex and nicotine dependence. Physician blind to allocation
Participants	396 smokers interested in quitting within 30 days, smoking ≥ 15 cigs/day 48% F, av. age 38, av. cigs/day 23-24
Interventions	1. Nicotine patch (15mg x 8wks, 10mg x 2wks, 5mg x 2wks) free, physician advice (x 3 15min, 2 wks before, 4 wks, 12 wks after quit date) 2. As 1, plus proactive TC, nurse counsellors, stage-based, 3 sessions at 2, 6, 13 wks.
Outcomes	Abstinence at 12m PP. Validation: CO, but self-reported rates reported. Only 1 disconfirmation
Notes	Effect of adjunct TC compared to NRT and counselling alone. Similar counselling scripts to Orleans 1991
Allocation concealment	B – Unclear

Study Rimer 1994

Methods	Country: USA
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Characteristics of included studies (Continued)

	Setting: community Recruitment: volunteers from American Association for Retired Persons Randomization: method not specified
Participants	1867 smokers aged 50-75 (12m data based on 1391, 1225 in relevant arms) interested in finding out about quitting. 63% F, Av age 61, av cigs/day 27
Interventions	1. Standard S-H manual (not included in this review) 2. S-H manual tailored for older smokers (Clear Horizons) 3. Tailored manual and 2 x 10-15 min proactive TC at 4-8 wks and 16-20 wks. Also access to a quitline
Outcomes	Abstinence at 12m. Validation: none
Notes	3 vs 2, effect of TC compared to S-H. Preliminary 12m results used.
Allocation concealment	B – Unclear

Study Rodgers 2005

Methods	Country: New Zealand Setting: community Recruitment: community volunteers Randomization: central, concealed until after assignment
Participants	1705 smokers interested in quitting within 1m. 59% F, median age 22, median cigs/day 15
Interventions	All participants informed about national Quitline and availability of subsidised NRT 1. Control: 1 message every 2 wks, thanking for participation. 1m free text messaging after 6m follow up. 2. Intervention: 5 individualized messages/day for 1 wk before & 4 wks after quit day. 3 per wk to wk 26. Free text messaging for 1m after TQD. Reactive messages could be requested.
Outcomes	Abstinence at 6m (continuous lapse-free) Validation: none at 6m, random sample at 6 wks showed trend towards higher misreporting in control
Notes	New for 2006 update
Allocation concealment	A – Adequate

Study Roski 2003

Methods	Country: USA Setting: 40 clinics Recruitment: smokers identified by survey Randomization: cluster randomized by clinic, method not stated
Participants	3436 smokers identified by survey, 2729 followed up, 1664 in relevant arms
Interventions	Access to proactive service 1. Financial incentives for clinical performance targets 2. As 1, plus smoker registry allowing referral to proactive TC for smokers ready to quit; 7 calls over 2m. (Control arm not included in review)
Outcomes	Abstinence at 6m for 7 days Validation: none
Notes	New for 2006 update Does not contribute to meta-anALYSIS. Test of providing TC to increase provider adherence to guidelines. Most of the smokers surveyed did not report use of counselling services
Allocation concealment	D – Not used

Characteristics of included studies (Continued)

Study	Smith 2004
Methods	Country: Canada Setting: 10 communities Recruitment: Volunteers calling a quitline Randomization: centralised, stratified by community, sequential envelope, random sequence
Participants	632 smokers intending to quit 61% F, av. age 42, 61% had prior use of NRT
Interventions	Factorial design comparing two intensities of telephone counselling and two types of S-H (collapsed in this review): 1. 50 min proactive TC, quit date set, 2 calls at 2 & 7 days post TQD 2. As 1, plus 4 further calls at 14, 21, 35, 40 days 3. Control: S-H only
Outcomes	Abstinence at 12m, sustained at 3m & 6m follow ups, also PP. Validation: none
Notes	New for 2006 update. All TC arms compared to S-H only control in main analysis. Results not reported by factorial groups; 'no significant interactions or main effects at any follow-up' no data from authors, estimate used in test of intensity. Findings sensitive to choice of outcome, control point prevalence rates increase over time. 76% received at least 1 call, 22% of intensive condition received all calls, 56% of mimal condition received both calls
Allocation concealment	A – Adequate

Study	Solomon 2000
Methods	Country: USA Setting: community Recruitment: volunteers for free nicotine patch trial Randomization: method not specified
Participants	214 female smokers, >4 cigs/day, intending to quit in next 2 wks Av. age 33, av cigs/day 24
Interventions	1. Free nicotine patch (dose based on smoking level) for up to 10 wks. 2. Free patch plus proactive TC from female ex-smoker, 7 hrs training. Calls for up to 3m, starting pre quit, quit day, day 4, average 7.
Outcomes	Abstinence at 6m (7 days at 3m & 6m) Validation: CO =< 8ppm. 7-12% disconfirmation rate. Participants who did not provide samples remained classified as quitters
Notes	Intervention participants received an average of 7 calls. 95% received at least 1. Participants could call Nicoderm support line, 21% of control vs 8% of intervention did so.
Allocation concealment	B – Unclear

Study	Solomon 2005
Methods	Country: USA Setting: community Recruitment: volunteers for free nicotine patch trial Randomization: method not specified
Participants	330 female smokers >4 cigs /day, intending to quit in next 2 wks Av. age 34, av. cigs/day 24
Interventions	1. Free nicotine patch (dose based on smoking level) for up to 10 wks.

Characteristics of included studies (Continued)

	2. Free patch plus proactive TC from female ex smoker, 7 hrs training. Calls for up to 4m, up to 12m, starting pre quit, quit day, day 4
Outcomes	Abstinence at 6m (30 days at 3m & 6m) Validation: none
Notes	New for 2006 update. Replication of Solomon 2000 with more extended telephone contact. Average number of calls 8.2, average duration 10 min
Allocation concealment	D – Not used

Study	Stotts 2002
Methods	Country: USA Setting: antenatal clinics Recruitment: pregnant continuing smokers Randomization: method not specified
Participants	269 pregnant smokers at wk 28 Av. age 28, approx 50% smoked <60 cigs/week
Interventions	All participants had received brief counselling and 7 mailed S-H booklets in early pregnancy. 1. 20-30 min motivational interviewing-based proactive TC call in 28th-30th wk of pregnancy, tailored letter, 2nd call. 2. No further contact.
Outcomes	Abstinence or 'a few puffs' at 6m postpartum Validation: none postpartum, cotinine at wk 34
Notes	New for 2006 update The common intervention in early pregnancy was not treated as face-to-face contact within the trial. 55% received complete intervention
Allocation concealment	B – Unclear

Study	Swan 2003
Methods	Country: USA Setting: Group health Co-op Recruitment: volunteers Randomization: procedure built into study database
Participants	1524 smokers ≥ 10 cigs/day, 57% F, av. age 45, av. cigs/day 23, 44% history of depression
Interventions	Proactive Factorial design, 300 mg/day and 150 mg/day bupropion doses collapsed. Prescription was mailed. No face-to-face contact during enrolment or treatment. 1. Free & Clear proactive TC (4 brief calls), access to quitline & S-H materials 2. Zyban Advantage Program (ZAP) tailored S-H materials, single telephone call after TQD, access to Zyban support line
Outcomes	Abstinence at 12m (7 day PP) Validation: none
Notes	New for 2006 update No dose/behavioural treatment interaction at 12m so bupropion arms collapsed.
Allocation concealment	A – Adequate

Study	Thompson 1993
Methods	Country: USA

Characteristics of included studies (Continued)

	Setting: Workplace and community Recruitment: initially from 4 workplaces, targeting blue collar workers, widened to general community to meet targets. Callers gave oral consent and baseline assessment of smoking characteristics prior to randomization Randomization: method not specified
Participants	382 (341 smokers, 41 recent quitters). Majority in contemplation or action SoC, 24% 'blue collar' 59% F, av. age 41, av. cigs/day 18-22
Interventions	Reactive 1. Callers to hotline received general information based on fact sheets, and sent S-H material. 2. Callers were given information based on stage, and encouraged to take next step in cessation process. Script tailored to blue collar workers using focus groups
Outcomes	Abstinence at 6m (PP) (subset followed to 12m) Validation: saliva samples sought but not tested. Surrogates asked to confirm status
Notes	2 vs 1, comparison between stage-based and nonspecific brief counselling The stage-model counselling was based on the approach used by the NCIS. Kinne 1991 gives data about call rates from original target worksites. Average call length 34 min for stage-based, 20 min for standard
Allocation concealment	B – Unclear

Study **Zhu 1996**

Methods	Country: USA Setting: community Recruitment: callers to a quitline Randomization: pseudo-random, according to last 2 digits of telephone number
Participants	3030 smokers who called a smokers' helpline and were ready to quit in next wk 57% F, av. age 36, av. cigs/day 20
Interventions	1. S-H materials only 2. S-H materials and 50 min pre-quit TC 3. As 2, plus up to 5 further sessions TC at 1,3, 7, 14 & 30 days
Outcomes	Abstinence at 13m, sustained for 12m Validation: Cotinine <10mg/nl in a convenience sample. Disconfirmation rate not used to correct data, but refusal and misreport rates similar in all groups
Notes	2 & 3 vs 1 in effect of TC compared to S-H alone. 3 vs 2 in effect of multiple sessions Approx 65% of single session & 67% of multisession group received some counselling. Multisession participants received 4 calls on average.
Allocation concealment	C – Inadequate

Study **Zhu 2002**

Methods	Country: USA Setting: community Recruitment: callers to a quitline Randomization: method not stated. 60/40 split. Only randomized when counselling demand exceeded capacity
Participants	3282 smokers calling quitline, ready to quit within 1 wk & wanting counselling. 56% F, av. age 38, av. cigs/day 20
Interventions	1. S-H pack, motivational materials, counselling provided if smoker made contact to request it. 2. S-H as 1, plus prequit and up to 6 post-quit calls within 3m. Included quitting history, motivation, self efficacy, social support, planning, relapse prevention

Outcomes	Abstinence at 13m, sustained for 12m Validation: none
Notes	2 vs 1, effect of TC versus S-H alone. Authors also analysed subgroups of control who did and didn't seek counselling. 32% of C and 72% of T group received counselling
Allocation concealment	B – Unclear
AHRQ: Agency for Healthcare Research and Quality ALA: American Lung Association CO: carbon monoxide HMO: health maintenance organization ITT: intention-to-treat (analysis) m: months NCIS: National Cancer Information Service NRT: nicotine replacement therapy PP: point prevalence SES: socio-economic status S-H: Self-help materials SoC: Stage of Change TC: Telephone counselling TQD: Target quit date	

Characteristics of excluded studies

Study	Reason for exclusion
Ahijevych 1995	Pilot study with 12 wks follow up, after which the advice and control groups were offered the intervention. The intervention was 4 weekly mailings and telephone calls from a lay facilitator. No participants in any group (n=64) quit smoking.
Amos 1995	Not a controlled trial. Callers to a workplace helpline set up in conjunction with a non-smoking policy were followed up. 16% of smokers reported they had quit 3m later, 28% of those who had tried to quit. It was estimated that between 3-3.3% of smokers in the company had called in the first 3m.
Balanda 1999	Callers to a helpline were randomized to 1 of 2 self-help materials. No counselling was given. Follow up only 1m after receipt of materials. There was no difference in cessation rates between the booklet groups. Overall 16% of 515 respondents reported 7 day abstinence at 1m.
Best 1977	Allocation not stated to be random. Telephone follow up compared to group behavioural treatment with aversive smoking only. Abstinence rates were lower for the telephone group.
Blikrud 2002	Not a randomized trial.
Borland 1989	Not a controlled trial. Evaluation of calls to a helpline.
Borland 2004	All participants called a quitline, test of different S-H materials. Included in Cochrane review of S-H (Lancaster 2005).
Boyle 2004b	Intervention for smokeless tobacco use not smoking.
Brandon 2000	Focus on preventing relapse. See Cochrane review on relapse prevention (Hajek 2005).
Buchanan 2004	Multicomponent intervention, only 12 wks follow up
Conway 2004	Focus on preventing relapse. See Cochrane review on relapse prevention (Hajek 2005).
Cummings 1988	Callers to a helpline were randomized to one of 4 different s-h programmes or an information control. No counselling was given. There was no difference in outcome between any of the s-h booklets or the control, with sustained abstinence rates of 4-8% at 6m.
Cummings 1989	Does not measure smoking cessation. Assesses impact of a media campaign to get women smokers with young children to call a quit line. Call rates compared in media markets with and without a campaign. Campaign

increased call rates 10 times compared to control markets. Proportion of calls from target group also increased. Cost per caller estimated at \$61.

Curry 2003	Telephone component cannot be evaluated independently of face-to-face counselling.
Davis 1992	All participants were women with young children who called a hotline and received same stage-based counselling. They were randomized to receive 3 different s-h guides. See Cochrane review of S-H (Lancaster 2005)
Daza 2005	Only 12 wk follow up reported.
DeBusk 1994	Telephone component cannot be evaluated independently of face-to-face counselling. The intervention included in-hospital physician advice and counselling by a nurse as well as post-discharge telephone contact, and was compared to usual care.
Decker 1989	Not random or pseudo-random. Interventions ran sequentially. Participants receiving mailed materials had access to a hotline.
Dubren 1977	Recent quitters were randomized to access to recorded messages, not a counsellor. Short follow up (4 wks).
Hasuo 2004	Telephone component cannot be evaluated independently of face-to-face counselling. The intervention included in-hospital counselling by a nurse.
Holtrop 2005	The purpose of the telephone call was to encourage participants to enroll in quitline services
Johnson 1999	Telephone component cannot be evaluated independently of face-to-face counselling. The intervention included in hospital counselling by a nurse. Quasi-random design.
Koffman 1998	Three worksites allocated to different interventions. No way to distinguish variation due to worksite from effect of intervention.
Lando 1996	Previously included, recruited only recent quitters so now covered in Cochrane review of relapse prevention (Hajek 2005)
Leed Kelly 1996	The intervention included 1 session of face-to-face counselling with telephone follow up. Results, which did not show any intervention effect, are given in Bobo 1998.
Lichtenstein 2002b	No long-term outcomes yet reported.
Manfredi 1999	The intervention included the opportunity of a motivational telephone call following provider advice and s-h components. Follow up was only 5-8 wks.
McBride 2002	The focus of the intervention was on genetic susceptibility feedback. Effect of telephone support cannot be evaluated independently.
Ockene 1992	Telephone support could not be evaluated independently of combined intervention.
Owen 2000	Not a controlled trial. Survey of callers to UK quitline. Conservatively assuming that non-responders at 1 yr were continuing smokers and assuming 20% of reported successes would fail biochemical validation gave an adjusted quit rate of 15.6% (95% CI 12.7% to 18.9%).
Platt 1997	Not a controlled trial. A panel sample of callers to the Scottish Smokeline was followed up for 1 yr. 607 (71% of original sample) were reached. The quit rate was 23.6%, 8.2% reported not smoking for >80% of the previous yr. It was estimated that 5.9% of the adult smokers in Scotland called during the year.
Prue 1983	The amount and timing of telephone contact is unclear. The main component was a s-h programme, compared to a waiting list control. Total of 40 participants.
Racelis 1998	Intervention addressed multiple risk factors, number of smokers enrolled not specified.
Ratner 2004	Telephone support could not be evaluated independently of face-to-face counselling.
Reid 1999b	Not a controlled trial. Followed 258 nicotine patch purchasers who enrolled for support program of 4 calls from a trained nurse counsellor. 36% quit rate at 8m.
Ringen 2002	Not randomized. Smokers chose intensity of support.
Schneider 1995	Evaluated a telephone support system. All smokers recruited had access to the interactive programme. Random subsets were selected for access to messages about nicotine gum, sent a reminder to call, or sent a user's manual.

Characteristics of excluded studies (Continued)

Shiffman 2000	Follow up 12 wks. At this point there was no evidence that the addition of a single proactive call 2 days after the target quit date increased cessation rates over 6 mailings of tailored materials.
Simon 1997	Telephone component cannot be evaluated independently of face-to-face counselling. The intervention included brief counselling and NRT.
Simon 2003	Telephone component cannot be evaluated independently of face-to-face counselling. The intervention included in-hospital nurse counselling as well as post-discharge telephone contact, and was compared to a minimal intervention.
Sivarajan 2004	Telephone component could not be evaluated independently of combined intervention.
Stevens 1993	Telephone component cannot be evaluated independently of face-to-face counselling. The intervention included in-hospital physician advice and counselling by a nurse as well as post-discharge telephone contact, and was compared to usual care.
Taylor 1990	Telephone component cannot be evaluated independently of face-to-face counselling. The intervention included in-hospital physician advice and counselling by a nurse as well as post-discharge telephone contact, and was compared to usual care.
Terazawa 2001	Telephone component could not be evaluated independently of combined intervention.
Urso 2003	Only 12 wks follow up.
Wadland 1999	Not randomized. The treated groups were recruited by different means and given different interventions both of which included telephone counselling by nurses or counsellors.
Wadland 2001	Only 3m follow up.
Westman 1993	Telephone component cannot be evaluated independently of face-to-face counselling.
Zhu 2000a	Not an RCT. All participants called the California Smokers' Helpline and received 1 session of counselling and planned to use NRT. Those who chose to receive further counselling were compared to those who did not.

CI: confidence interval

m: month(s)

NRT: nicotine replacement therapy

s-h: self help

ANALYSES

Comparison 01. Reactive counselling via quitlines/helplines/hotlines

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Long term cessation			Odds Ratio (Fixed) 95% CI	Totals not selected

Comparison 02. Interventions for smokers calling quitlines - comparison of different support during a single call

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Long term cessation	2	1804	Odds Ratio (Fixed) 95% CI	1.12 [0.84, 1.50]

Comparison 03. Interventions for smokers calling quitlines - effect of additional proactive calls

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Long term cessation	8	18468	Odds Ratio (Fixed) 95% CI	1.41 [1.27, 1.57]

Comparison 04. Interventions for smokers not calling quitlines - subgroups by baseline support components

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Long term cessation - All trials, subgroups by amount of control group support	30	17467	Odds Ratio (Fixed) 95% CI	1.33 [1.21, 1.47]

Comparison 05. Interventions for smokers not calling quitlines - subgroups by intensity: 1-2, 3-6, >6 calls

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
03 Long term cessation	29	17467	Odds Ratio (Fixed) 95% CI	1.35 [1.22, 1.48]

Comparison 06. Interventions for smokers not calling quitlines - subgroups by motivation

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 Long term cessation	29	17467	Odds Ratio (Fixed) 95% CI	1.35 [1.22, 1.48]

INDEX TERMS

Medical Subject Headings (MeSH)

Counseling [methods]; *Hotlines; Randomized Controlled Trials; *Smoking Cessation

MeSH check words

Humans

COVER SHEET

Title	Telephone counselling for smoking cessation
Authors	Stead LF, Perera R, Lancaster T
Contribution of author(s)	LS and TL contributed to developing the protocol, extracting data and writing the review. RP became an author from issue 1 2003 and extracted data and contributed to updating the text.
Issue protocol first published	2000/4
Review first published	2001/2
Date of most recent amendment	23 May 2006
Date of most recent SUBSTANTIVE amendment	11 April 2006
What's New	Updated for Issue 4, 2006. Twenty two new studies, studies of relapse prevention now excluded. Comparisons reorganised, additional subgroup analyses

Updated for Issue 1, 2003. Four new trials, of which 3 contribute to meta-analysis. No major changes to conclusions.

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 11 April 2006

Date authors' conclusions section amended 15 October 2002

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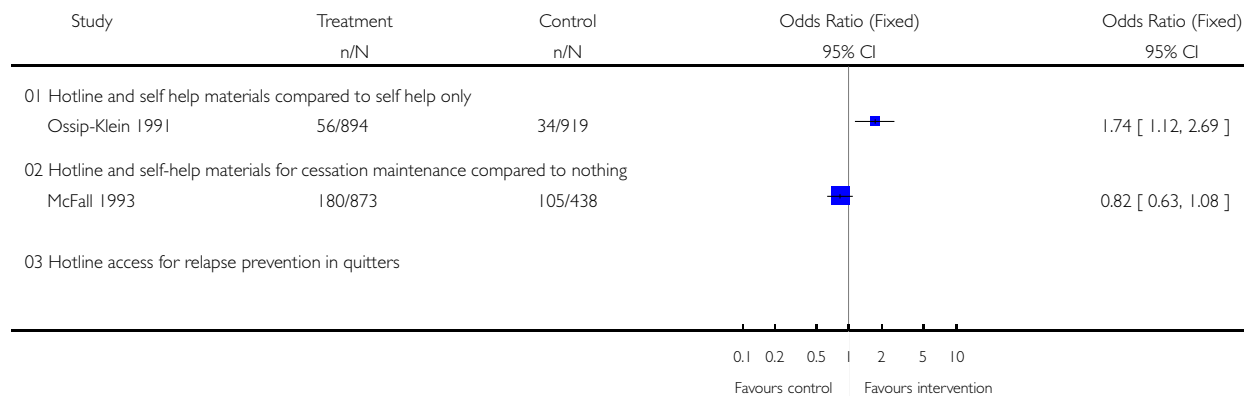
GRAPHS AND OTHER TABLES

Analysis 01.01. Comparison 01 Reactive counselling via quitlines/helplines/hotlines, Outcome 01 Long term cessation

Review: Telephone counselling for smoking cessation

Comparison: 01 Reactive counselling via quitlines/helplines/hotlines

Outcome: 01 Long term cessation

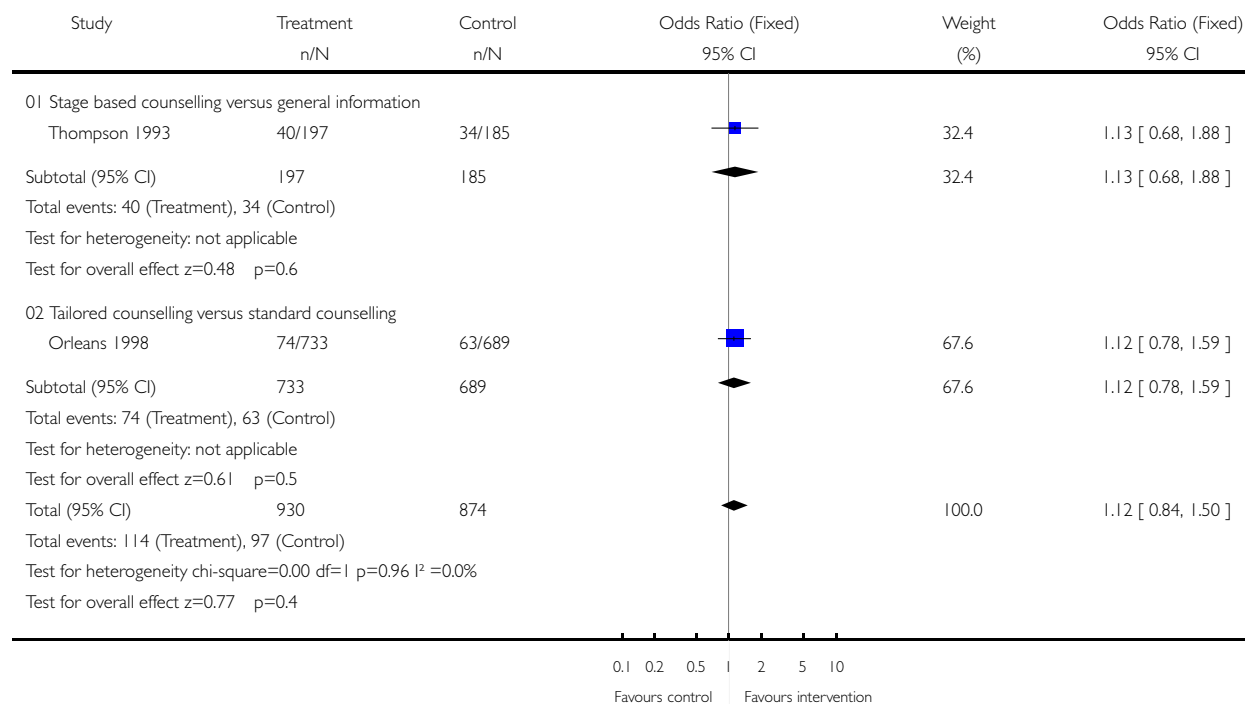


Analysis 02.01. Comparison 02 Interventions for smokers calling quitlines - comparison of different support during a single call, Outcome 01 Long term cessation

Review: Telephone counselling for smoking cessation

Comparison: 02 Interventions for smokers calling quitlines - comparison of different support during a single call

Outcome: 01 Long term cessation

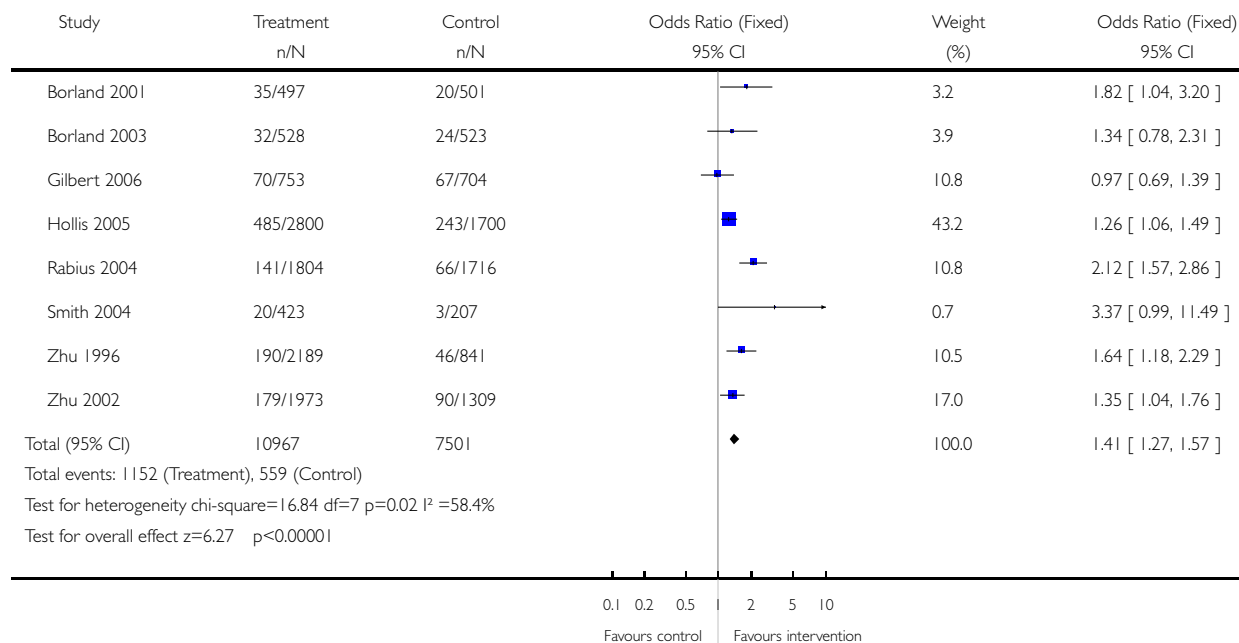


Analysis 03.01. Comparison 03 Interventions for smokers calling quitlines - effect of additional proactive calls, Outcome 01 Long term cessation

Review: Telephone counselling for smoking cessation

Comparison: 03 Interventions for smokers calling quitlines - effect of additional proactive calls

Outcome: 01 Long term cessation

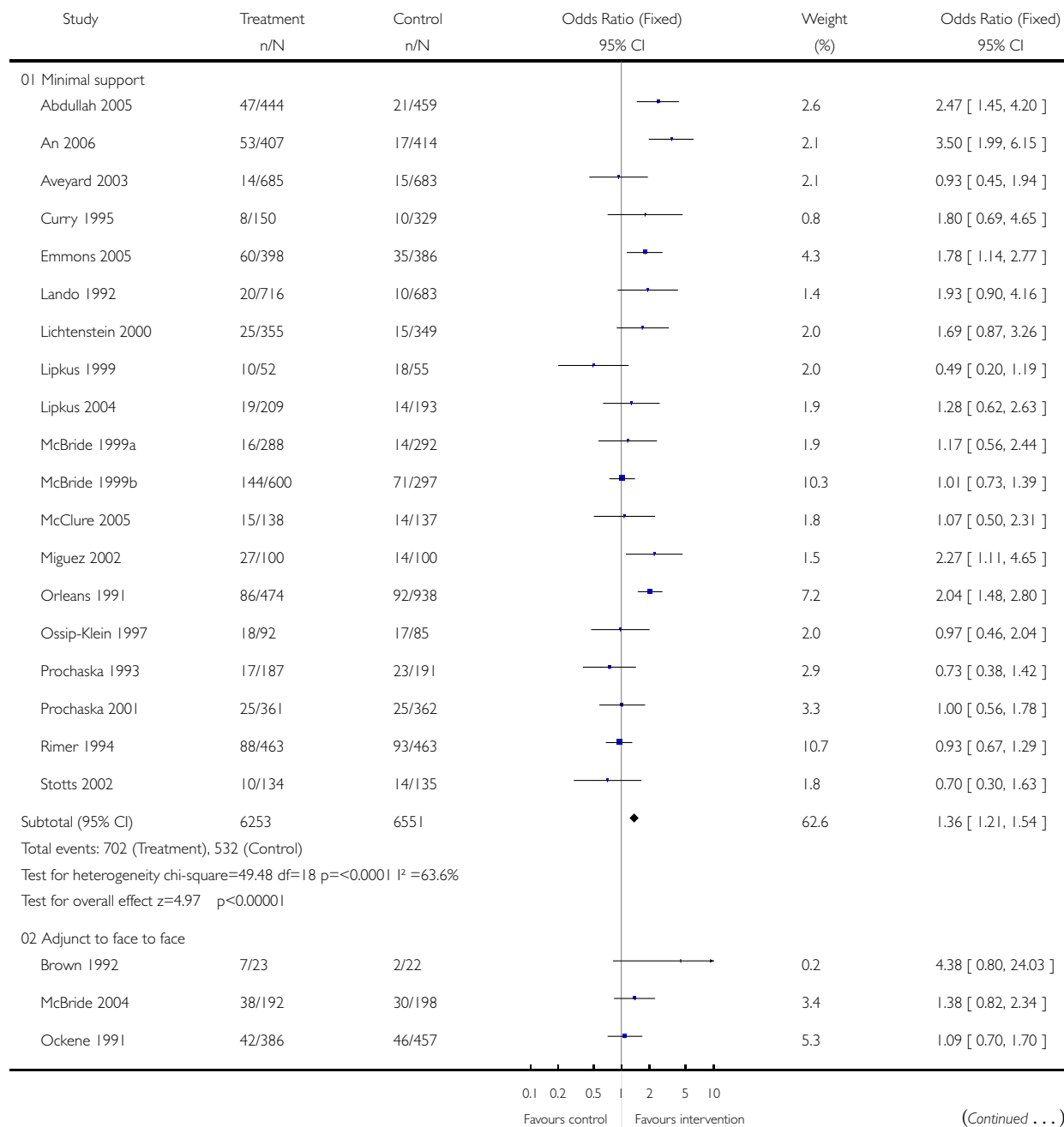


Analysis 04.01. Comparison 04 Interventions for smokers not calling quitlines - subgroups by baseline support components, Outcome 01 Long term cessation - All trials, subgroups by amount of control group support

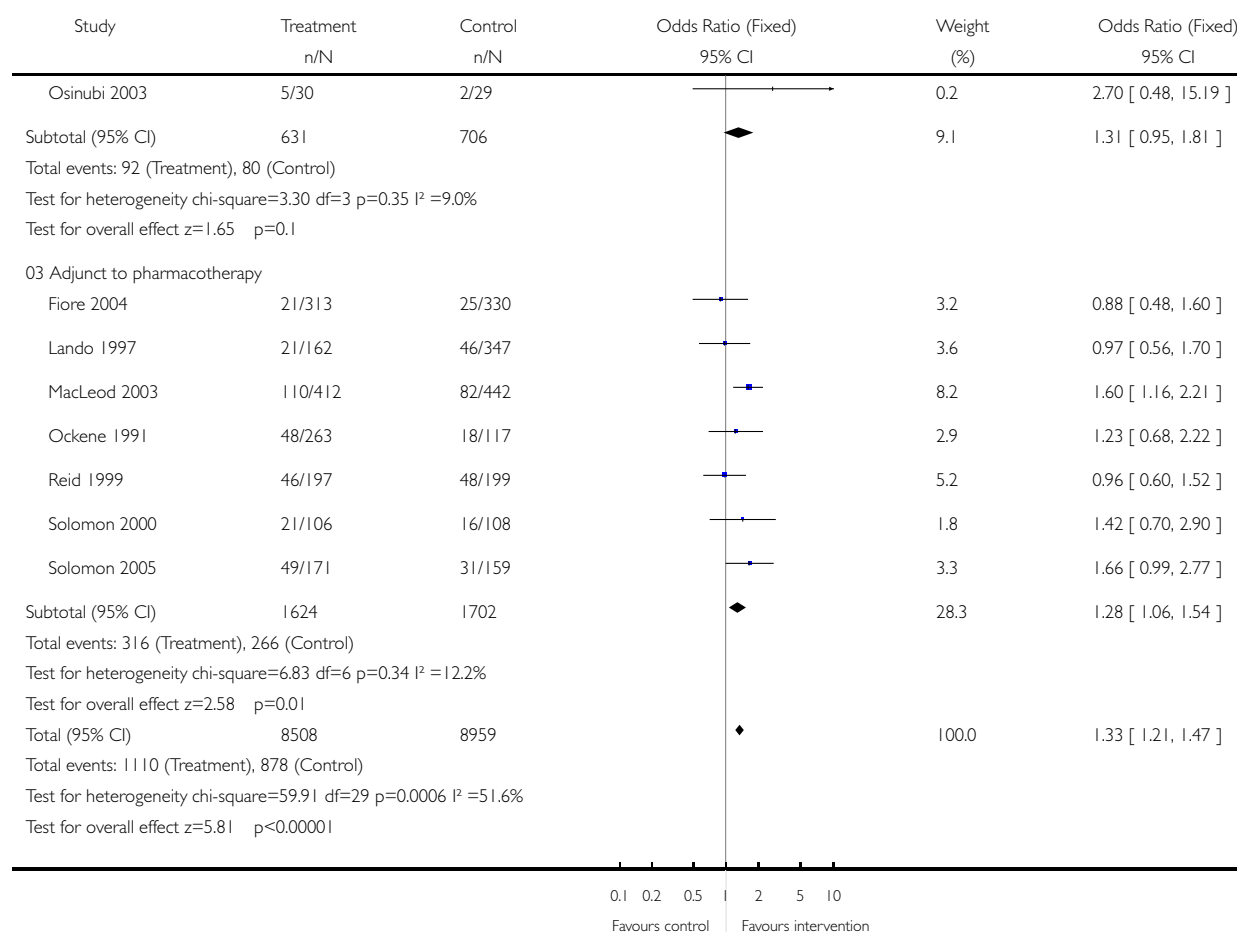
Review: Telephone counselling for smoking cessation

Comparison: 04 Interventions for smokers not calling quitlines - subgroups by baseline support components

Outcome: 01 Long term cessation - All trials, subgroups by amount of control group support



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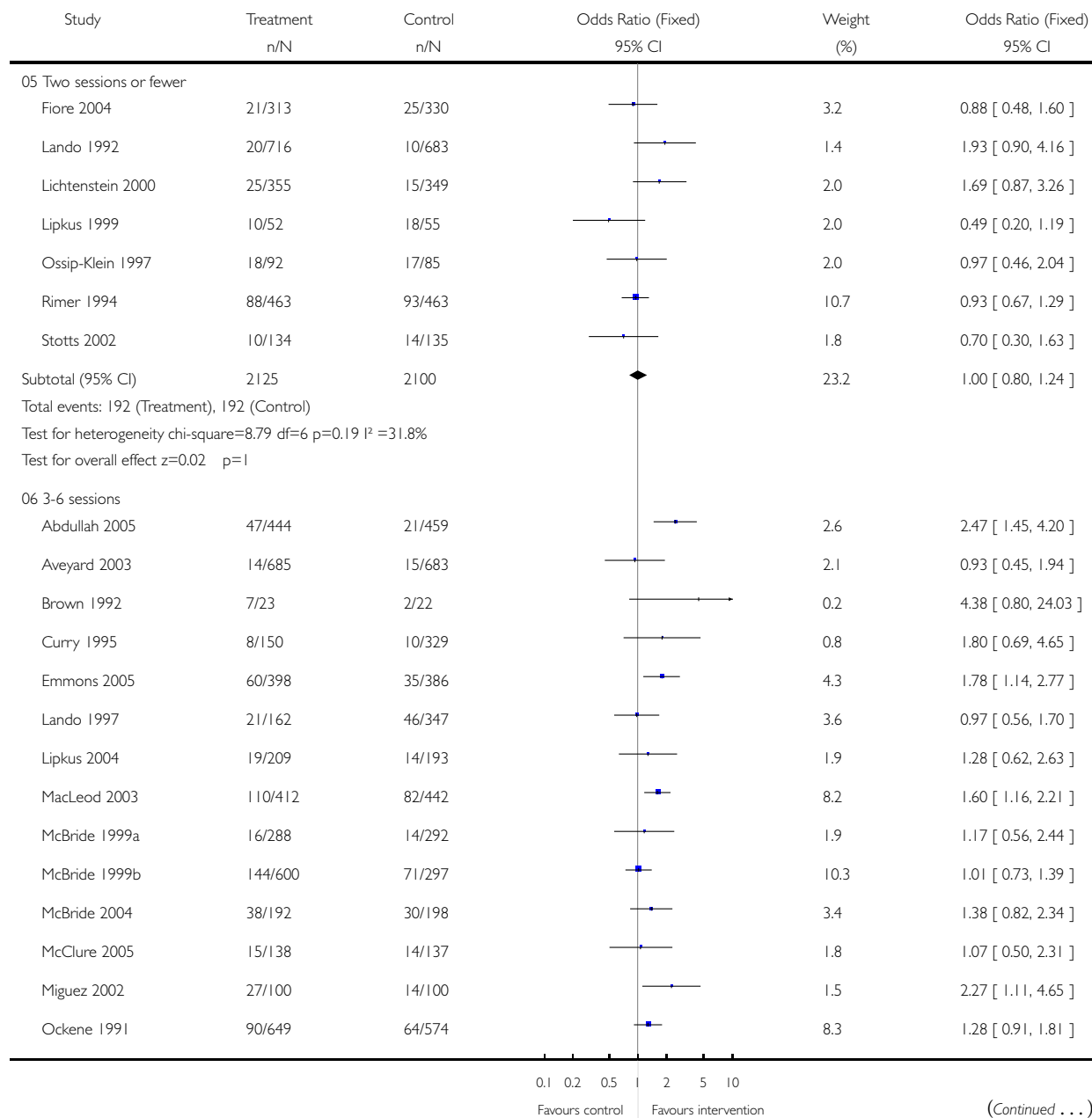


Analysis 05.03. Comparison 05 Interventions for smokers not calling quitlines - subgroups by intensity: 1-2, 3-6, >6 calls, Outcome 03 Long term cessation

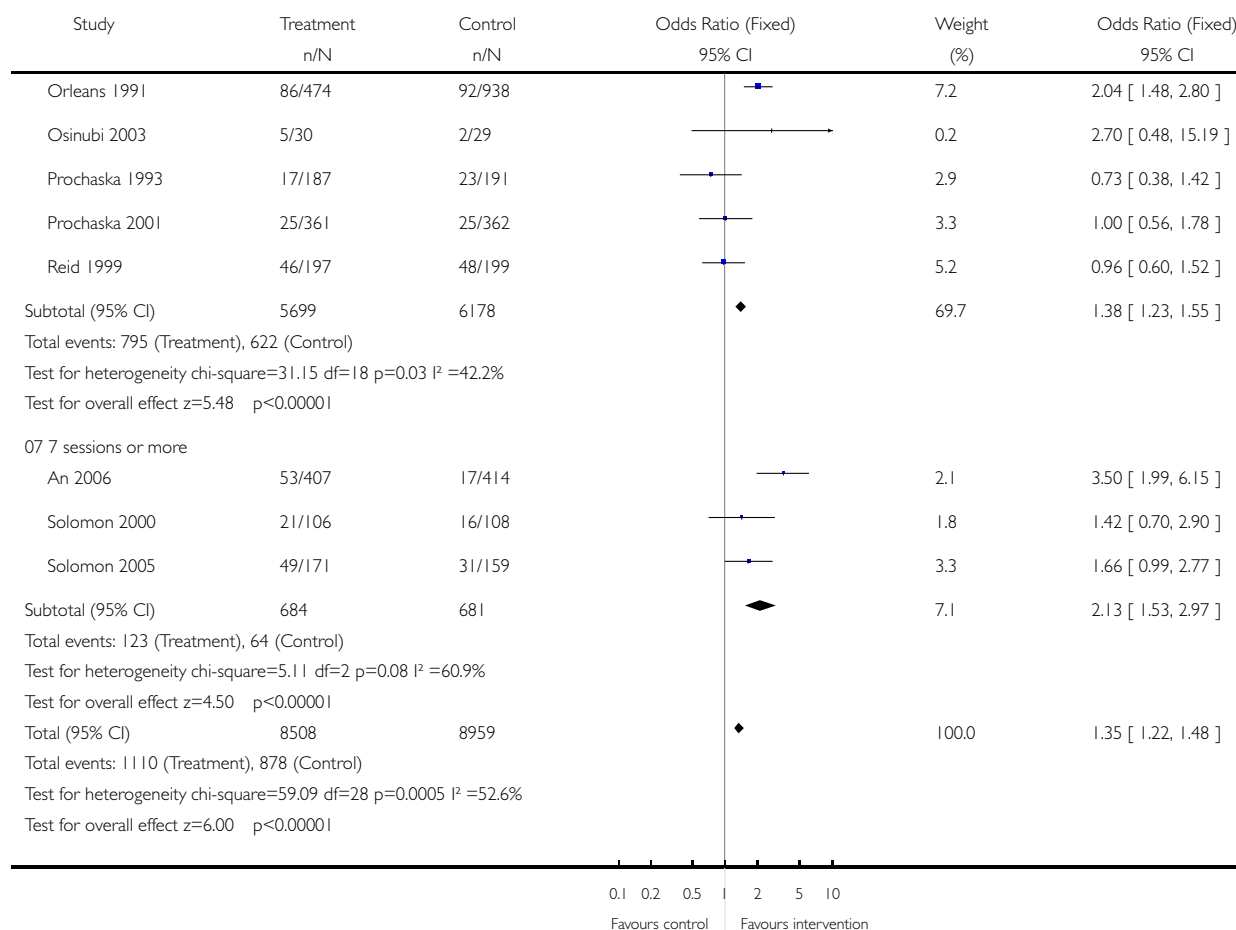
Review: Telephone counselling for smoking cessation

Comparison: 05 Interventions for smokers not calling quitlines - subgroups by intensity: 1-2, 3-6, >6 calls

Outcome: 03 Long term cessation



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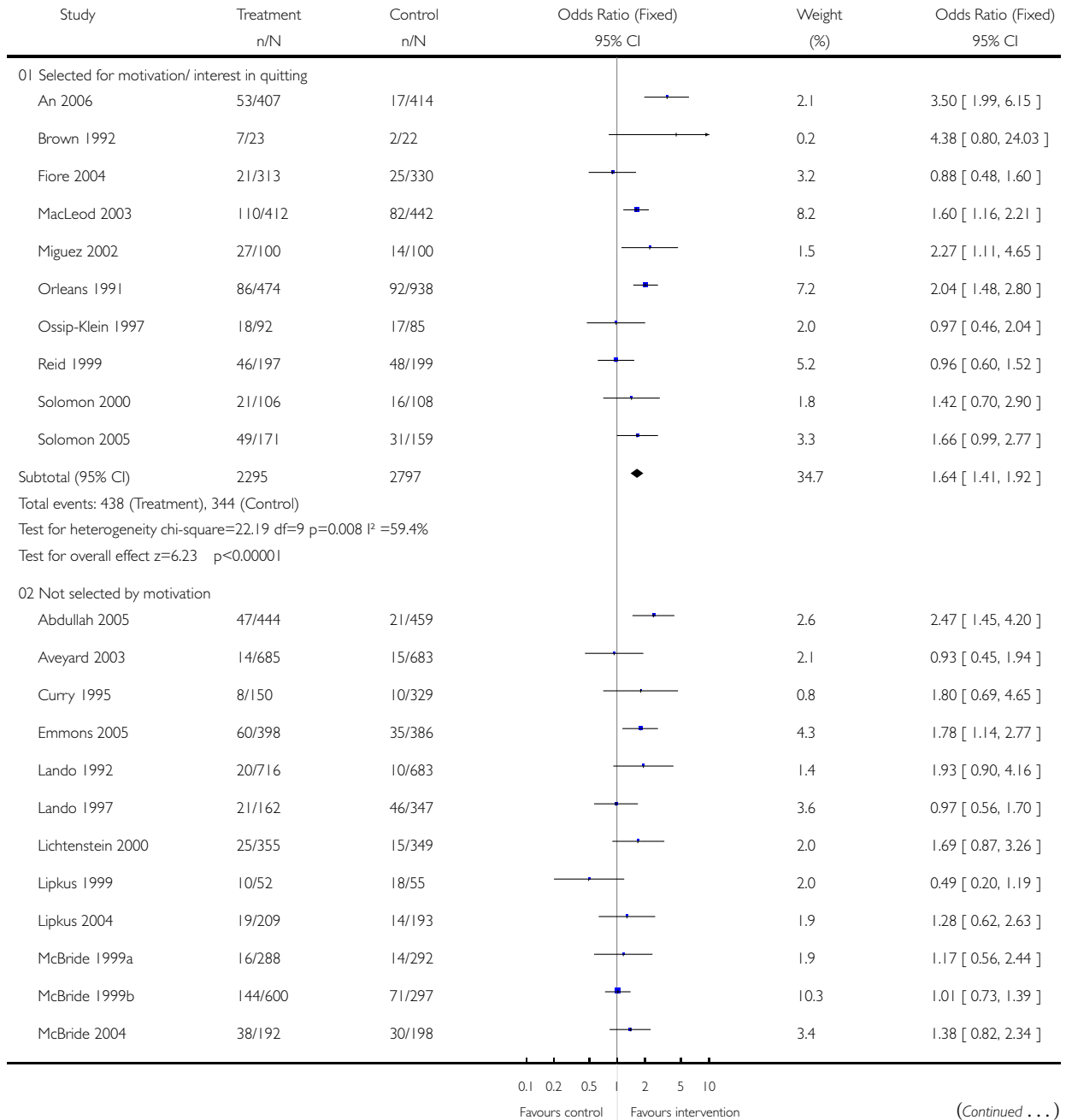


Analysis 06.01. Comparison 06 Interventions for smokers not calling quitlines - subgroups by motivation, Outcome 01 Long term cessation

Review: Telephone counselling for smoking cessation

Comparison: 06 Interventions for smokers not calling quitlines - subgroups by motivation

Outcome: 01 Long term cessation



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