

# Motivational interviewing for smoking cessation (Review)

Lai DTC, Cahill K, Qin Y, Tang JL



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## TABLE OF CONTENTS

HEADER . . . . .	1
ABSTRACT . . . . .	1
PLAIN LANGUAGE SUMMARY . . . . .	2
BACKGROUND . . . . .	2
OBJECTIVES . . . . .	3
METHODS . . . . .	3
RESULTS . . . . .	5
Figure 1. . . . .	8
Figure 2. . . . .	9
Figure 3. . . . .	10
DISCUSSION . . . . .	11
AUTHORS' CONCLUSIONS . . . . .	12
ACKNOWLEDGEMENTS . . . . .	12
REFERENCES . . . . .	12
CHARACTERISTICS OF STUDIES . . . . .	15
DATA AND ANALYSES . . . . .	30
Analysis 1.1. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 1 All studies: longest duration and strictest definition of abstinence. . . . .	31
Analysis 1.2. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 2 By therapist. . . . .	32
Analysis 1.3. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 3 By session duration. . . . .	33
Analysis 1.4. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 4 By number of sessions. . . . .	34
Analysis 1.5. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 5 By number of follow-up calls. . . . .	35
WHAT'S NEW . . . . .	35
HISTORY . . . . .	36
CONTRIBUTIONS OF AUTHORS . . . . .	36
DECLARATIONS OF INTEREST . . . . .	36
SOURCES OF SUPPORT . . . . .	36
DIFFERENCES BETWEEN PROTOCOL AND REVIEW . . . . .	36
INDEX TERMS . . . . .	37

[Intervention Review]

## Motivational interviewing for smoking cessation

Douglas TC Lai<sup>1</sup>, Kate Cahill<sup>2</sup>, Ying Qin<sup>3</sup>, Jin-Ling Tang<sup>4</sup>

<sup>1</sup>Professional Development and Quality Assurance, Department of Health, Chai Wan, Hong Kong. <sup>2</sup>Department of Primary Health Care, University of Oxford, Oxford, UK. <sup>3</sup>School of Public Health, The Chinese University of Hong Kong, Hong Kong, China. <sup>4</sup>Dept of Community and Family Medicine, The Chinese University of Hong Kong, Lek Yuen Health Centre, Shatin, China

Contact address: Douglas TC Lai, Professional Development and Quality Assurance, Department of Health, 1/F Main Block, Pamela Youde Nethersole Eastern Hospital, 3 Lok Man Rd, Chai Wan, Hong Kong. [drdouglaslai@gmail.com](mailto:drdouglaslai@gmail.com).

**Editorial group:** Cochrane Tobacco Addiction Group.

**Publication status and date:** Edited (no change to conclusions), published in Issue 3, 2010.

**Review content assessed as up-to-date:** 15 July 2009.

**Citation:** Lai DTC, Cahill K, Qin Y, Tang JL. Motivational interviewing for smoking cessation. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD006936. DOI: 10.1002/14651858.CD006936.pub2.

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### ABSTRACT

#### Background

Motivational Interviewing (MI) is a directive patient-centred style of counselling, designed to help people to explore and resolve ambivalence about behaviour change. It was developed as a treatment for alcohol abuse, but may help smokers to make a successful attempt to quit.

#### Objectives

To determine the effects of motivational interviewing in promoting smoking cessation.

#### Search strategy

We searched the Cochrane Tobacco Addiction Group Specialized Register for studies with terms (motivational OR motivation OR motivating OR motivate OR behavi\* OR motivat\*) and (interview\* OR session\* OR counsel\* OR practi\*) in the title or abstract, or as keywords. Date of the most recent search: April 2009.

#### Selection criteria

Randomized controlled trials in which motivational interviewing or its variants were offered to smokers to assist smoking cessation.

#### Data collection and analysis

We extracted data in duplicate. The main outcome measure was abstinence from smoking after at least six months follow up. We used the most rigorous definition of abstinence in each trial, and biochemically validated rates where available. Subjects lost to follow up were treated as continuing smokers. We performed meta-analysis using a fixed-effect Mantel-Haenszel model.

#### Main results

We identified 14 studies published between 1997 and 2008, involving over 10,000 smokers. Trials were conducted in one to four sessions, with the duration of each session ranging from 15 to 45 minutes. All but two of the trials used supportive telephone contacts, and supplemented the counselling with self-help materials. MI was generally compared with brief advice or usual care in the trials. Interventions were delivered by primary care physicians, hospital clinicians, nurses or counsellors. Our meta-analysis of MI versus brief advice or usual care yielded a modest but significant increase in quitting (RR 1.27; 95% CI 1.14 to 1.42). Subgroup analyses suggested that MI was effective when delivered by primary care physicians (RR 3.49; 95% CI 1.53 to 7.94) and by counsellors (RR

1.27; 95% CI 1.12 to 1.43), and when it was conducted in longer sessions (more than 20 minutes per session) (RR 1.31; 95% CI 1.16 to 1.49). Multiple session treatments may be slightly more effective than single sessions, but both regimens produced positive outcomes. Evidence is unclear at present on the optimal number of follow-up calls.

There was variation across the trials in treatment fidelity. All trials used some variant of motivational interviewing. Critical details in how it was modified for the particular study population, the training of therapists and the content of the counselling were sometimes lacking from trial reports.

### Authors' conclusions

Motivational interviewing may assist smokers to quit. However, the results should be interpreted with caution due to variations in study quality, treatment fidelity and the possibility of publication or selective reporting bias.

## PLAIN LANGUAGE SUMMARY

### Does motivational Interviewing help people who smoke to quit?

Motivational interviewing or its variants are widely used to help people stop smoking. It is a counselling technique for helping people to explore and resolve their uncertainties about changing their behaviour. It seeks to avoid an aggressive or confrontational approach. It tries to steer people towards choosing to change their behaviour, and to encourage their self-belief. Our review found that motivational interviewing seems to be effective when given by general practitioners and by trained counsellors. Longer sessions (more than 20 minutes per session) were more effective than shorter ones. Two or more sessions of treatment appeared to be marginally more successful than a single session treatment, but both delivered successful outcomes. The evidence for the value of follow-up telephone support was unclear. Our results should be interpreted with caution, due to variations in how the treatment was delivered, what it included and the completeness of the evidence.

## BACKGROUND

### Description of the condition

Cigarette smoking remains one of the leading causes of preventable disease worldwide (USDHHS 2000). Various pharmacological and non-pharmacological methods to assist smoking cessation are available. There is good quality evidence for the effectiveness of several methods of smoking cessation. For instance, Stead 2008a has shown that brief advice from physicians can significantly increase the odds of quitting, and the effectiveness of nicotine replacement therapy (Stead 2008b), bupropion (Hughes 2007) and varenicline (Cahill 2008) have all been demonstrated. There is also evidence for the effectiveness of combining pharmacological and behavioural interventions. Both pharmacological and behavioural methods are considered as equal contributors to the overall success rates (Coleman 2004).

### Description of the intervention

The concept of motivational interview (MI) evolved from experience in treating alcohol abuse, and was first described by Miller in 1983. It is defined as 'a directive, client-centred counselling style for eliciting behavior change by helping clients to explore and resolve ambivalence' (Miller 1983).

### How the intervention might work

In motivational interviewing, Miller conceptualises that motivation may fluctuate over time or from one situation to another, and can be influenced to change in a particular direction (Miller 1994). Thus, lack of motivation (or resistance to change) is seen as something that is open to change. The main focus of MI is facilitating behaviour change by helping people to explore and resolve their ambivalence about behaviour change (Rollnick 1995). Miller and Rollnick also suggested that adopting an aggressive and/or confrontational style (as in traditional approaches) is likely to produce negative responses from people (like arguing), which then may be interpreted by the practitioner as denial or resistance. MI also differs from patient-centred approaches in that it is directive. That is,

in MI, there is a clear goal of exploring the subject's ambivalence in such a way that the patient is more likely to choose to change the behaviour in question in the desired direction. The four guiding principles: (a) expressing empathy, (b) developing discrepancy, (c) rolling with resistance, (d) supporting self-efficacy, have been detailed elsewhere (Miller 2002).

The motivational interviewing process is a brief psychotherapeutic intervention intended to increase the likelihood that a person will make an attempt to change their harmful behaviour. Adaptations of MI have ranged from brief 20-minute office interventions (Motivational consulting) to Motivation Enhancement Therapy (MET), a multi-session course of treatment, including a lengthy assessment, personalized feedback and follow-up interviews (Rollnick 1992, Lawendowski 1998). MI has been provided by telephone consultations and in group format also. MI and its various forms have been applied both as a stand-alone interventions or with other treatments, and in a range of settings. These include health settings such as general hospital wards, emergency departments, and general medical practice (Britt 2002).

### Why it is important to do this review

MI has been used primarily for the behavioural management of disorders. It has been used to treat alcohol abuse, drug addiction, weight loss, compliance with treatment for asthma and diabetes as well as for smoking cessation. Recent systematic reviews (Burke 2003; Knight 2006; Rubak 2005) have shown MI to be effective for alcohol, drugs, weight control, diet and exercise, but there has been little attempt to systematically review the evidence on MI applied specifically to smoking cessation.

Allsop 2007 has summarised the difficulties of assessing a given intervention's fidelity to the principles of MI: firstly, its limited theoretical basis compromises our understanding of its essential ingredients and processes; secondly, there are relatively few reliable and practical instruments with which to assess the training, quality and fidelity of implementation of MI's principles; and thirdly, research reports often give inadequate detail of the methods used in what purports to be an MI intervention.

Our review attempts to address these pitfalls through the selection, assessment and analysis of the included trials.

## OBJECTIVES

The primary objective of our review is to determine whether or not motivational interviewing (MI) promotes smoking cessation.

Our hypotheses are:

- MI is effective in smoking cessation compared with no advice or simple advice (routine care).

- MI effects are relatively long-lasting compared with other therapies.

- Intensive MI (more sessions, longer duration of each session) is more effective than single or shorter sessions.

- MI counsellors' attributes, e.g. occupation (doctor, nurse, counsellors), experience or level of training in MI, are potential moderators of the effect size.

- MI quitters have similar relapse rate than those who quit with other therapies.

- MI has incremental effects when combined with other therapies.

- MI does not have any significant harmful effects.

## METHODS

### Criteria for considering studies for this review

#### Types of studies

- Randomized controlled trials
- Cluster-randomized controlled trials, with the unit of allocation an institution or organization (e.g., school, hospital, workplace) where one or more professionals are implementing the interventions.

#### Types of participants

Participants could be tobacco users of either gender recruited in any setting. The only exceptions are trials which only recruited pregnant women or adolescent smokers, as their particular needs and circumstances warrant them being treated as separate populations.

#### Types of interventions

The intervention must be based primarily upon the motivational interviewing (MI) principles laid down by Miller and Rollnick (Miller 2002). The trial must, in the opinion of the authors, comply with MI principles and practice, beyond simply referring to the concept.

- The study should make explicit reference to at least some of these MI principles (e.g. exploring ambivalence, decision balance, assessment of motivation and confidence to quit, eliciting 'change talk' and supporting self-efficacy).
- To ensure fidelity of intervention, some form of monitoring of MI should also be reported. This could include the details concerning the training of the counsellor and measures to ensure

the quality of MI sessions e.g. by videotaping the sessions or by using an assessment scale and supervision.

- The intervention could be delivered on an individual basis or as group sessions.
- Even the briefest of interventions may be acceptable, provided that it met our other inclusion criteria. It is unclear how brief an adaptation of MI may be while still conforming to MI principles and techniques.
- Face-to-face and telephone-based interviews are both included
- The therapists could be any healthcare professional or counsellor.
- Trials with a pharmacological co-intervention (e.g. nicotine replacement therapy) are included, provided that the pharmacotherapy was given to all participants and not the intervention being tested.
- The comparison (control) intervention could be brief advice (i.e. verbal instruction with a 'stop smoking' message, with or without information on the harmful effects of smoking), a low-intensity intervention, or routine care.

Motivational interviewing is frequently linked with the transtheoretical ('stages of change') model of behaviour change. However, it is conceptually and practically distinct from it, and we have not included trials primarily testing that approach. Stage-based interventions will be covered in a separate review (Cahill 2007 [protocol]).

### Types of outcome measures

The primary outcome used in the review is smoking cessation. Trials not including data on smoking cessation rates are excluded. We have preferred sustained abstinence over point prevalence, where both were available. We report abstinence at the longest follow up, and have required a minimum follow up of six months from the start of treatment. Where biochemical validation was used, only those subjects meeting the biochemical criteria for cessation are regarded as abstainers. Patients lost to follow up were regarded as being continuing smokers, and all patients randomized are included in the denominator (an intention to treat analysis).

### Search methods for identification of studies

#### Electronic searches

Trials were identified from the Tobacco Addiction Review Group's specialised register, using the terms (motivational OR motivation OR motivating OR motivate OR behavi\* OR motivat\*) and (interview\* OR session\* OR counsel\* OR practi\*) in title or abstract, or as keywords. This register has been developed from electronic searching of MEDLINE, EMBASE, PsycINFO and Web

of Science, together with handsearching of specialist journals, conference proceedings and reference lists of previous trials and overviews. The Tobacco Addiction Group's full search strategy, used to compile the Specialised Register, can be viewed in the [Tobacco Addiction Group module](#) on *The Cochrane Library*.

### Searching other resources

We cross-checked our results with the MINT database of past and current research into motivational interviewing (MINT 2009). We also searched local journals and languages in Chinese (including Mainland and Taiwan). In trials where details of the methodology were unclear or where results were not expressed in a form that allowed extraction of the necessary key data, we wrote to the investigators to request the information.

### Data collection and analysis

#### Selection of studies

We checked the abstracts of studies generated by the search strategy for relevance, and then acquired full reports of any trials that might be suitable for the review. Two authors independently assessed and selected candidate trials for inclusion, and each independently extracted the data from them. We have noted reasons for the non-inclusion of studies ([Characteristics of excluded studies](#)).

#### Data extraction and management

The following information about each trial, where available, is presented in the table '[Characteristics of included studies](#)':

- Details of study design (including method of allocation, blinding, study structure)
- Location and setting of the trial (e.g. hospital-based, clinic-based, community-based)
- Method of recruitment to the study
- Sample size calculations
- Status of the participants, e.g. only motivated volunteers or all smokers
- Eligibility and exclusion criteria, and demographic descriptors
- Type and quality of MI training provided to the therapists
- Any procedures followed to ensure MI fidelity
- Description of the intervention (including the nature, frequency and duration of MI), and any co-interventions used
- Outcome measures: definition of smoking abstinence used for primary outcome, timing of longest follow up, any biochemical validation
- Reporting of drop-outs and losses to follow up.

### Assessment of risk of bias in included studies

Studies are evaluated on the basis of the quality of the randomization procedure and allocation concealment, blinding, incomplete outcome data assessment and any other bias. (Cochrane Handbook 2008; Schulz 2002a; Schulz 2002b).

### Measures of treatment effect

Where possible we have extracted smoking outcomes as continuous abstinence, but we have accepted less strict definitions (e.g. point prevalence abstinence) where continuous abstinence was not available.

### Dealing with missing data

We conducted an intention-to-treat analysis (i.e. using as the denominator all participants randomized to their original groups) where the data were available, and we assumed that those participants lost to follow up were continuing smokers.

### Assessment of heterogeneity

To investigate statistical heterogeneity, we have used the  $I^2$  statistic, given by the formula  $[(Q - df)/Q] \times 100\%$ , where  $Q$  is the chi squared statistic and  $df$  is its degrees of freedom (Higgins 2003). This describes the percentage of the variability in effect estimates that is due to heterogeneity rather than to sampling error (chance). A value greater than 50% may be considered to represent substantial heterogeneity. If heterogeneity was present, we would perform a random-effects meta-analysis if we could not explain the heterogeneity by study characteristics.

### Data synthesis

Pooled treatment effects are estimated as relative risks, using the Mantel-Haenszel fixed-effect model. Smoking cessation outcome data are reported as the number of quitters in each group divided by the number of participants receiving the treatment, i.e. the risk ratio with 95% confidence intervals. A ratio greater than 1 indicates that more people quit in the treatment group than in the control group. Measures of effective interventions appear to the right of the axis on the meta-analysis graphs. We pooled the data provided that no significant heterogeneity between the trials was demonstrated.

Cluster-randomized trials (with the therapist or site as the unit of allocation) have been included in the meta-analyses using patient level data.

### Subgroup analysis and investigation of heterogeneity

#### Subgroups

In view of possible heterogeneity between studies, we analysed the trials in the following subgroups:

- Stratified by the type of counsellor delivering the intervention e.g. doctor, nurse
- Stratified by the intensity of the counselling, e.g. duration of each session and number of sessions
- The intensity of follow-up support, usually by phone calls.

## RESULTS

### Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

### Results of the search

Our search returned 691 papers. We excluded any that targeted adolescents or pregnant women. We acquired full reports of 42 studies potentially relevant to the review.

### Included studies

We identified 14 studies published between 1997 and 2008 for inclusion in this review, covering more than 10,000 smokers. Full details of all the included and excluded studies are given in the relevant Tables ([Characteristics of included studies](#); [Characteristics of excluded studies](#)).

### Recruitment and settings

All the trials except two (Butler 1999 in the UK and Soria 2006 in Spain) were conducted in the United States. Two were set in general practices (Butler 1999; Soria 2006), one in participants' homes (Borrelli 2005), and one was delivered through a telephone quitline service (Hollis 2007). Two programmes were provided through screening clinics (Cigrang 2002; McClure 2005), four in specialist outpatient clinics (Glasgow 2000; Curry 2003; Hokanson 2006; Stein 2006), and four in hospitals (Rigotti 1997; Dornelas 2000; Hennrikus 2005; Bock 2008).

One study (Cigrang 2002), set on a Texan air force base, recruited only male participants using smokeless tobacco. Three studies recruited only female participants: Glasgow 2000 recruited women smokers attending Planned Parenthood clinics. McClure 2005 recruited women smokers who had an abnormal pap smear or colposcopy. Curry 2003 recruited women smokers attending paediatric clinics. All the trials except for Cigrang 2002 and Hollis 2007 recruited participants without specific reference to their motivation to quit smoking.

### Intervention

The most commonly used approach to motivational interviewing (MI) has been one in which the smoker is given feedback intended to develop discrepancy between smoking and personal goals in a non-threatening manner (Butler 1999; McClure 2005; Hokanson

2006; Soria 2006). MI was delivered in face-to-face sessions in all the studies except for Cigrang 2002, McClure 2005 and Hollis 2007, in which the counselling was telephone-based. None of the included studies used MI in groups. Ten studies delivered the MI intervention in a single session; three studies (Borrelli 2005; Soria 2006; Stein 2006) each provided three sessions, and McClure 2005 four sessions (by phone). The duration for each session ranged from 10 to 40 minutes.

Ten studies included follow-up telephone calls, ranging from one (Borrelli 2005), to two, three or four (Rigotti 1997; Cigrang 2002; Glasgow 2000; Curry 2003; Hollis 2007; Bock 2008), or up to six (Hennrikus 2005; Hokanson 2006) or seven calls (Dornelas 2000). The calls typically lasted around 11 minutes each.

Five trials (Hennrikus 2005; Hokanson 2006; Soria 2006; Hollis 2007; Bock 2008) either offered smoking cessation pharmacotherapies (NRT or bupropion) or encouraged their use. Apart from Hollis 2007, who included NRT patches as an intervention component in their factorial study design, the use and type of pharmacotherapy was not the intervention being tested.

MI interventions were compared in most studies with 'usual care' or brief advice (ranging from 2 to 15 minutes), often with self-help manuals, booklets or videos; only two trials (Butler 1999; Soria 2006) did not offer supportive written or audio-visual materials to any of the participants. Several trials also referred control participants to local smoking cessation services (Dornelas 2000; Cigrang 2002; Hennrikus 2005; Hokanson 2006; Hollis 2007) or to a phone counselling service (McClure 2005). In this review, we have not distinguished between brief advice, usual care and self-help materials as the control intervention with which MI was compared.

#### **Provider**

MI was delivered by general practitioners (Butler 1999; Soria 2006), hospital physicians (Rigotti 1997; Curry 2003), nurses (Curry 2003; Borrelli 2005; Hennrikus 2005; Hokanson 2006), counsellors (Glasgow 2000; Curry 2003; McClure 2005; Hokanson 2006; Hollis 2007; Bock 2008; Cigrang 2002; Stein 2006) or psychologists (Dornelas 2000). Although hospital clinicians contributed to the counselling in at least two of the studies (Glasgow 2000; Curry 2003), they were never the main or only counsellor in any of the included trials.

#### **Training of the provider**

Details of therapist training in MI were provided in eleven studies (Butler 1999; Glasgow 2000; Curry 2003; Borrelli 2005; Hennrikus 2005; McClure 2005; Hokanson 2006; Soria 2006; Stein 2006; Hollis 2007; Bock 2008). The length of training in MI ranged from two hours (Butler 1999) to 12 hours (Hennrikus 2005; Hokanson 2006), and was usually in the form of workshops.

#### **Description of the content of counselling delivered**

All the studies included in this review made explicit reference to using MI principles laid down by Miller and Rollnick (Miller 2002). Details of counselling were reported in nine studies. These included a full explanation of the main components and principles of

MI, including the four guiding principles (Butler 1999; Glasgow 2000; Cigrang 2002; Curry 2003; Hennrikus 2005; McClure 2005; Hokanson 2006; Hollis 2007; Bock 2008).

#### **Outcomes**

All the trials reported point prevalence abstinence as a main outcome. Four trials reported sustained abstinence at six months (Dornelas 2000; Cigrang 2002; Borrelli 2005; Bock 2008), and four trials at 12 months (Dornelas 2000; Curry 2003; Borrelli 2005; McClure 2005). Nine trials reported biochemically validated abstinence (Rigotti 1997; Glasgow 2000; Curry 2003; Borrelli 2005; Hennrikus 2005; McClure 2005 [12 months only]; Hokanson 2006; Soria 2006; Stein 2006). McClure 2005 used a modified 'bogus pipeline' for six-month assessments, i.e. warning participants that they could be asked to provide a confirmatory sample for self-reported abstinence, but not collecting it. Bock 2008 reported collecting saliva samples for cotinine validation, but defined continuous abstinence as self-reported cessation at all time points. Dornelas 2000 and Borrelli 2005 used testimony of informants to confirm self-reported abstinence.

#### **Cost effectiveness**

Two of the included studies offered an assessment of cost-effectiveness. Hollis 2007 reported on an MI counselling quitline service based in Oregon, with and without nicotine replacement therapy. The cost of intensive telephone counselling per participant was US\$132 (2004\$), and the incremental cost per quitter was US\$2640, compared with brief advice. Butler 1999, comparing brief advice with an MI consultation delivered by UK general practitioners, calculated that the cost of training each physician in MI techniques was £69.50, and the additional consultation time for each patient was £13.59. However, the sustained quit rates achieved in this programme did not reach statistically significant levels.

We did not find sufficient evidence from the trials in our review to test our remaining hypotheses (MI effects are relatively long lasting; MI quitters have similar relapse rates; MI does not have any significant harmful effects).

#### **Excluded studies**

Some of the excluded trials had a short follow up, typically three months. Some did not use true motivational interviewing techniques, while others delivered complex interventions from which the MI component could not be isolated. Several concentrated on adolescent smokers, which we exclude from this review. The excluded trials are listed in the table [Characteristics of excluded studies](#), with reasons for their exclusion.

#### **Risk of bias in included studies**

Full details of risk of bias assessments are given for each trial within the [Characteristics of included studies](#) table. Overall summary results of all the risk of bias assessments are displayed in Figure 1.

## Allocation

Six studies did not describe their methods of sequence generation or allocation concealment, and are rated as 'unclear' for those domains. The two general practice studies both used sealed opaque envelopes, assigned either from a sealed study pack (Butler 1999) or by a table of random numbers (Soria 2006). Two studies used methods of allocation rated in this review as inadequate, i.e. drawing random numbers from an envelope (Dornelas 2000) or drawing coloured ping-pong balls from a bag (Curry 2003). The remaining studies used block randomization procedures, with computerised lists or tables. Borrelli 2005 randomized the therapists rather than the participants.

## Blinding

Given the nature of the behavioural intervention, blinding of participants and intervention delivery were generally not feasible, which increased the potential risk of bias. However, nine of the 14

studies reported some measure of blinded assessment of outcome measurement.

## Other potential sources of bias

Validity of the intervention was maintained by audiotaping the counselling (Borrelli 2005; Hollis 2007; Bock 2008), by supervision throughout the study period (Glasgow 2000; Curry 2003; McClure 2005; Hokanson 2006), by booster sessions throughout the study to maintain counselling skills (Borrelli 2005), or by regular meetings among therapists (Henrikus 2005). Three studies (Rigotti 1997; Dornelas 2000; Cigrang 2002) gave no details of training or measures to ensure treatment fidelity. Only one study (Stein 2006) reported using a validated instrument, i.e. the Motivational Interviewing Skill Code (MISC) to measure adherence to MI principles.

We have prepared a funnel plot of the included studies (Figure 2), which suggests that there may be some publication and/or reporting bias in favour of positive findings.

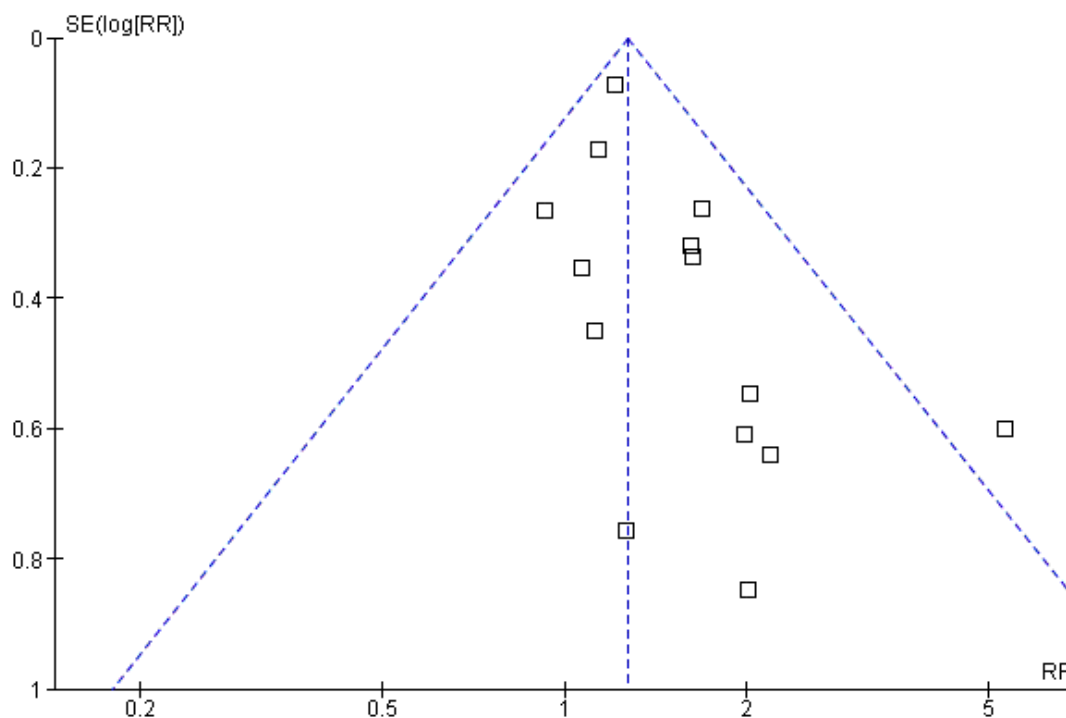
Figure 1

**Figure 1. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.**

	Adequate sequence generation?	Allocation concealment?	Blinding?	Free of other bias?
Bock 2008	?	?	+	+
Borrelli 2005	?	?	+	+
Butler 1999	+	+	+	?
Cigrang 2002	?	?	?	?
Curry 2003	-	-	?	?
Dornelas 2000	?	?	?	?
Glasgow 2000	+	?	+	+
Henrikus 2005	+	+	?	?
Hokanson 2006	+	?	?	?
Hollis 2007	+	?	+	?
McClure 2005	?	?	+	+
Rigotti 1997	-	?	+	?
Soria 2006	+	+	+	?
Stein 2006	?	?	+	+

Figure 2

**Figure 2. Funnel plot of comparison: 1 MI vs brief advice/usual care: all trials, outcome: 1.1 Smoking Cessation: longest duration and strictest definition of abstinence.**

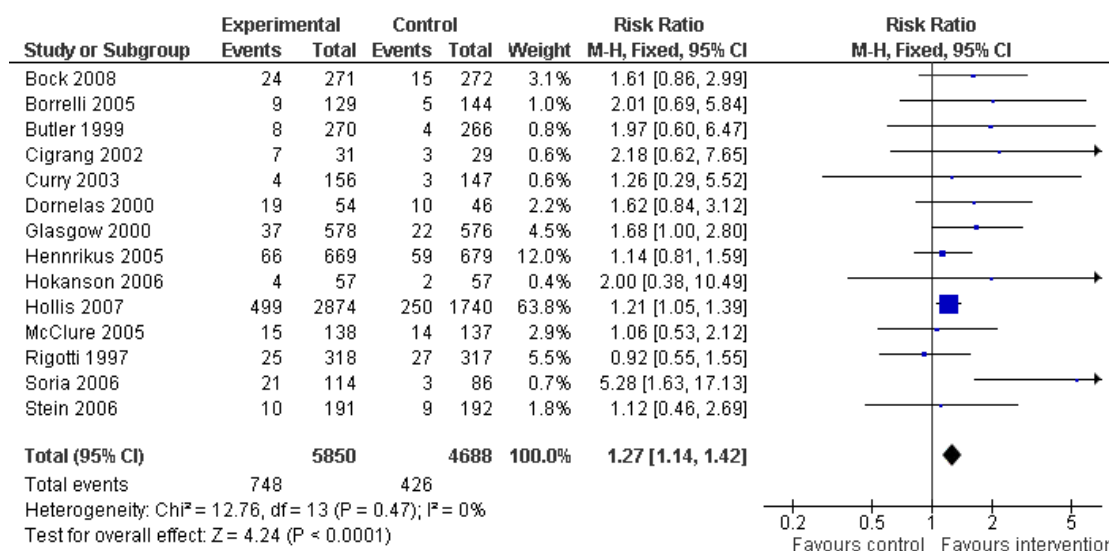


### Effects of interventions

#### Motivational interviewing vs brief advice or usual care

The overall effect across all 14 included trials (N = 10,538), using the strictest definition of abstinence and longest follow up, gives a modestly significant effect (relative risk [RR] 1.27; 95% confidence interval [CI] 1.14 to 1.42; *analysis 1.1*). There was no evidence of heterogeneity ( $I^2=0\%$ ). See [Figure 3](#). Pooling point prevalence abstinence for all trials at a minimum of six months follow up yielded a similar effect (RR 1.25; 95% CI 1.12 to 1.39), and a slightly higher effect from pooling the six trials reporting continuous abstinence at six months or longer (RR 1.51; 95% CI 1.08 to 2.11) [analyses not shown].

**Figure 3. Forest plot of comparison: I Motivational Interviewing vs brief advice/usual care, outcome: I. I All studies: longest duration and strictest definition of abstinence.**



A sensitivity analysis excluding trials of participants already motivated to make a quit attempt (Cigrang 2002; Hollis 2007) yielded a slightly higher but similar effect (RR 1.37; 95% CI 1.14 to 1.65). The nine trials which biochemically validated their outcomes also delivered a comparable relative risk (1.31; 95% CI 1.06 to 1.62) [analyses not shown].

#### Comparison between therapists

In a subgroup analysis by type of therapist, MI delivered by general practitioners had a larger effect (two trials, N = 736; RR 3.49; 95% CI 1.53 to 7.94; *analysis 1.2.1*) compared with nurses (five trials, N = 2038; RR 1.23; 95% CI 0.90 to 1.66; *analysis 1.2.2*) or counsellors (nine trials, N = 7546; RR 1.27; 95% CI 1.12 to 1.43; *analysis 1.2.3*). Curry 2003 used nurses and counsellors to deliver the intervention, and appears in both analyses (not pooled).

#### Duration of session

Pooling studies in which the MI sessions lasted less than 20 minutes produced a non-significant effect (five trials, N = 1809; RR 1.14; 95% CI 0.80 to 1.63; *analysis 1.3.1*). Studies with MI sessions lasting longer than 20 minutes may be more successful, but overlapping confidence intervals preclude a firm conclusion (eight trials, N = 7382; RR 1.31; 95% CI 1.16 to 1.49; *analysis 1.3.2*).

#### Number of sessions

Interventions delivered in a single session (RR 1.24; 95% CI 1.11 to 1.40; *analysis 1.4.1*) appeared to be as effective as multiple session interventions (RR 1.69; 95% CI 1.09 to 2.60; *analysis 1.4.2*). The multiple session analysis suggested moderate heterogeneity between studies, with an I<sup>2</sup> of 52%.

#### Number of follow-up sessions

Subgroup analysis of studies by the number of follow-up calls sug-

gested an inverse relationship between effectiveness and amount of telephone follow up. The lowest relative risk of effective cessation was associated with the higher number of follow-up calls, indicating no incremental benefit of multiple calls. Studies with no follow-up calls yielded a RR of 2.19 (95% CI 1.23 to 3.92; *analysis 1.5.1*); however, this analysis demonstrated moderate heterogeneity, with an I<sup>2</sup> of 55% (P = 0.11), so should be viewed with caution. Studies offering one or two follow-up calls had a RR of 1.77 (95% CI 1.08 to 2.90; *analysis 1.5.2*), while those offering three or more calls had an RR of 1.22 (95% CI 1.08 to 1.37; *analysis 1.5.3*).

Only Hollis 2007 tested for differences between offering follow-up calls and no follow-up support within a single trial. For our meta-analyses we have combined the moderate and intensive intervention arms in that trial, to compare them with a brief advice intervention. We have also separately compared the moderate intervention (no follow-up support) with the intensive intervention (up to four follow-up calls), to quantify the value of the additional support calls. The RR was 1.05 (95% CI 0.89 to 1.23), suggesting no added benefit for additional telephone support in this trial.

#### Face-to-face versus telephone

Three of the trials (Cigrang 2002; McClure 2005; Hollis 2007) delivered their counselling by telephone only, without any face-to-face contact. Sensitivity analysis suggested that, although the relative risk increased slightly for face-to-face counselling trials only (1.40, 95% CI 1.15 to 1.70), the difference was not statistically significant.

#### Incremental effects

Only [Cigrang 2002](#) tested for an incremental effect of adding a self-help manual and a supportive video to the initial counselling call. At six month follow up, 5/29 [17%] in the usual care (control) group had quit, compared with 3/11 [27%] for the MI counselling only group and 6/20 [30%] for the counselling plus additional materials group. Differences were not statistically significant. We have used the combined intervention group for the analyses throughout this review.

## DISCUSSION

### Summary of main results

Although the overall effect of motivational interviewing (MI) compared with brief advice or usual care is modest (RR 1.27, 95% CI 1.12 to 1.43), certain components appear to enhance its efficacy. There is some limited evidence in this review that MI interventions delivered by general practitioners confer greater benefit than those delivered by nurses, counsellors or research staff. Primary care doctors, counselling patients with whom they are already familiar and have an established rapport, may be better suited to this approach. However, this finding is based on two relatively small studies, and should not be overstated.

The question of the amount and intensity of therapist contact presents a somewhat contradictory picture. Longer duration of MI sessions (greater than 20 minutes) appear to be more successful than brief sessions. However, this finding must be set against the counter-intuitive pattern of more follow-up calls possibly leading to lower success rates. This inverse relationship may have been confounded by the inclusion of both the primary care studies in the 'No follow-up calls' grouping (see next paragraph). There is also moderate heterogeneity between the studies with no follow-up calls, so this finding should be treated with caution. Similarly, while multiple sessions appear to be marginally more effective than single session interventions, the paucity of multiple session studies and moderate heterogeneity between them limits the value of this finding.

The two general practice trials were the only ones which did not provide any supportive self-help materials to any participants, but this may have been resource- and context-driven rather than a deliberate feature of the study design. The decision not to offer materials or phone calls to support subsequent behaviour change in the general practice trials or in the trial with participants in a methadone maintenance programme may have been based pragmatically on the fact that the intervention providers (general practitioners and clinic staff) routinely and regularly maintained contact with the people involved in their trial, as part of their general health care. Any subsequent need for further counselling or more information could be expected to be met within their regular non-trial contacts.

Although face-to-face counselling (with or without telephone follow-up calls) conferred a marginally greater benefit than counselling delivered entirely by telephone, the difference was not statistically significant, and MI by either mode of delivery was superior to brief advice or usual care.

Training methods and duration for delivery of the MI counselling ranged from none to twelve hours, and monitoring of delivery and treatment fidelity was highly variable. Only one trial ([Stein 2006](#)) reported using a validated training tool (the Motivational Interviewing Skill Code).

The included trials demonstrated a wide range of components and techniques for the delivery of MI, making direct comparisons across the trials problematic. It is unclear from these trials whether specific MI components or just the 'spirit' of MI is important, and whether short-term achievements translate conclusively into long-term abstinence. The question also remains whether the success rates in the intervention groups were attributable to MI techniques, or simply to a higher intensity intervention than that received by the control group.

The studies generally did not define what would have counted as a quit attempt, and did not report the proportion of participants who tried to quit, with or without success. The rate of quit attempts can be interpreted as a mediator of treatment effect, and the lack of such data limits the findings of this review.

Despite the positive findings of our meta-analyses, absolute quit rates were relatively low. Most of the trials included smokers unmotivated to quit, and produced modest quit rates across the board. The exceptions were [Dornelas 2000](#), in which inpatients hospitalised for myocardial infarction achieved quit rates of 35% (intervention) and 22% (control), and [Hollis 2007](#), in which smokers contacting a telephone support service achieved quit rates of 17% (intervention) and 14% (control). Quit rates across the intervention groups ranged from 3% to 35%, with a weighted average of 11.5%. Control group quit rates ranged from 2% to 22%, with a weighted average of 7.7%.

Although the evidence in this review suggests that MI techniques can deliver successful rates of smoking cessation, the effect size is somewhat lower than that demonstrated for individual counselling (RR 1.39; 95% CI 1.24 to 1.57, across 30 trials; [Lancaster 2005](#)), and significantly lower than for group behaviour therapy (RR 1.98; 95% CI 1.60 to 2.46, across 53 trials; [Stead 2005](#)). Whether this discrepancy may be attributable to the limited evidence base, to the inclusion of smokers with low or no motivation to quit, or to lower efficacy of MI techniques for smoking cessation, remains an open question.

### Quality of the evidence

The included studies in this review generally reported adequately on their design, methods and conduct. Only two trials reported inadequate methods of sequence generation and/or allocation concealment, which are held to be key determinants of selection bias

(Schulz 2002a; Schulz 2002b). Five of the 14 trials also did not confirm blinding of outcome assessment. Sensitivity analyses testing exclusion for these factors did not alter the review's findings. Confining the analyses to biochemically validated outcomes or to continuous abstinence measures made little difference to the results of the meta-analyses.

Our funnel plot of the included studies (Figure 2) suggests a measure of publication bias and/or selective reporting, in favour of positive findings, which may compromise the strength of the evidence and the review's conclusions.

## AUTHORS' CONCLUSIONS

### Implications for practice

- Motivational interviewing appears to be modestly successful in promoting smoking cessation, compared with usual care or brief advice.
- Motivational interviewing delivered by general practitioners or in a general practice setting may deliver higher success rates. However, this may be attributable as much to the long-term doctor-patient relationship within the community as to the benefits of motivational interviewing.
- Longer sessions (20 minutes or more) of motivational counselling appear to be more successful than shorter sessions.
- The evidence is unclear for the optimal number of sessions or the number of follow-up calls.

### Implications for research

- Publication bias and/or selective reporting may have compromised the quality of the evidence in this review. Dissemination of small-scale or 'negative' findings would strengthen the evidence base.
- Greater clarity and consistency of methods, components and counselling techniques would improve comparability between trials.
- Future research should attempt to identify which core components of the motivational interviewing approach are effective, and whether modifying them enhances or reduces their effectiveness.
- Future research should compare interventions of equal intensity but different techniques, to test the specific effects of the MI approach.
- There were frequent discrepancies between self-reported and biochemically validated measures of abstinence, and several trials did not use any form of biochemical confirmation of abstinence. Biochemical validation tools should be used where possible in future research.

## ACKNOWLEDGEMENTS

We thank Professor Steve Allsop and Dr Delwyn Catley for reading and commenting on drafts of this review, and Professor Robert West for editorial comment.

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\* Indicates the major publication for the study

## CHARACTERISTICS OF STUDIES

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

#### Bock 2008

Methods	Location: Rhode Island, USA Setting: Observation unit of a hospital emergency department. Study: Chest Pain Smoking Study (CPSS) Recruitment: Admission records to identify participants. Motivation to quit not required.	
Participants	543 adult smokers, randomized to intervention (271) usual care (272). 52.9% M; 69.1% W; Mean age 47.7. Mean CPD 18.9	
Interventions	1. Intervention: Single 30 min session, delivered by study counsellors, based on MI, including use of decision-balance tool, summation of reasons to quitting versus continuing to smoke etc. If trying to quit, given ALA manual Two brief (<15 min) follow-up telephone calls at 2 and 4 wks after counselling session. 2. Usual care: Referral sheet to local SC resources. All quit attempters received brief call on TQD and TQD+7. All offered NRT if decided to quit. Quality of MI: Details of training of the counsellor provided. Intervention component checklists used to ensure treatment fidelity.	
Outcomes	Followed up by questionnaire at 1,3 and 6m PPA and CA at 6m. Validation by saliva cotinine, but results not reported. CA counted as self-reported abstinent at all time points.	
Notes		
<b>Risk of bias</b>		
<b>Item</b>	<b>Authors' judgement</b>	<b>Description</b>
Adequate sequence generation?	Unclear	Not stated
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Yes	Outcome assessor blinded
Free of other bias?	Yes	Training of the counsellor described. Intervention component checklists used to ensure treatment fidelity.

**Borrelli 2005**

Methods	Location: Rhode Island, USA Setting: home-care nursing programme Study: Project CARES Recruitment: Referred by nurse; motivation to quit not required.
Participants	278 adult smokers. 46% M. Mean age 57.2. 83.5% W. Mean cpd 21.1
Interventions	1. ME intervention: 3 x 20-30 min visits by home-care nurse plus 1 follow-up telephone call. Motivational interviewing to explore ambivalence, clarify goals/values, build self-efficacy/confidence. CO feedback. 2. Standard care: 1 visit plus brief counselling based on 5As (5-15 mins). All received manual <i>Clear Horizons</i> Quality of MI: Training described + details of treatment validity.
Outcomes	CA and PPA at 6 and 12m. CA defined as abstinent since last wave of data collection. Validation: CO <10 ppm. Also testimony from informants.
Notes	

***Risk of bias***

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	"We randomly selected 104 of 160 nurses to participate in the study". 98 nurses "were randomized"
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Yes	Assessors "blind to condition"
Free of other bias?	Yes	Booster sessions throughout the study to maintain counselling skills. Internal validity ensured by audiotaped supervision on a sub-sample of counselling sessions, monthly meeting with nurses.

**Butler 1999**

Methods	Location: S. Wales, UK Setting: 21 general practices (24 registrars) Recruitment: GPs asked to recruit 1st smoker coming to each surgery; motivation to quit not required.
Participants	536 adult smokers, randomized to MI (270) or brief advice (266). 29% M. Mean age 41. Mean cpd 25.5

**Butler 1999** (Continued)

Interventions	1. Structural motivational counselling for 1 session ( mean 10 mins) by GP. 1. Standardized brief advice (2 mins) Quality of MI: Training of GPs in MI and details of intervention briefly provided.	
Outcomes	PPA at 6m (self reported abstinence in the previous months) Validation: Attempted but abandoned	
Notes		
<b>Risk of bias</b>		
<b>Item</b>	<b>Authors' judgement</b>	<b>Description</b>
Adequate sequence generation?	Yes	Filed in a study pack and had to be opened in order
Allocation concealment?	Yes	Sequential blocks of six numbered sealed envelopes contained three allocations to each group, but the order varied.
Blinding? All outcomes	Yes	Outcome assessor, blinded to intervention group, chased non-responders at 6m
Free of other bias?	Unclear	Training in MI and details of MI provided. No treatment fidelity monitoring procedure

**Cigrang 2002**

Methods	Location: San Antonio, Tx, USA Setting: Screening clinic at air force base Recruitment: Smokeless tobacco (ST) users invited by phone, based on screening results; had to be motivated to make a quit attempt.
Participants	60 active-duty military men, using ST, randomized to intervention (31) or usual care (29). Mean age 31.
Interventions	1. Intervention: proactively contacted by researcher, asked about use of ST and counselled, and sent <i>Enough Snuff</i> manual and an <i>Enough Snuff</i> video if wishing to quit. Support calls (X2, 10 mins each). 2. Usual care. Encouraged to quit, and info on signing up to an 8-wk cessation course
Outcomes	PPA at 3m and 6m Validation: none
Notes	Data presented split by initial counselling call receivers (11) versus those who took the call + manual and video (20). Combined group used for this review

**Cigrang 2002** (Continued)

<b>Risk of bias</b>		
<b>Item</b>	<b>Authors' judgement</b>	<b>Description</b>
Adequate sequence generation?	Unclear	Not stated
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Unclear	Not stated
Free of other bias?	Unclear	No info on training of therapist; MI intervention adequately described

**Curry 2003**

Methods	Location: Seattle, WA, USA Setting: Four paediatric clinics Recruitment: Mothers attending with their children invited to participate; motivation to quit not required.
Participants	303 women, randomized to intervention (156) or control (147). Mean age 34, mean cpd 12, 33% W.
Interventions	1. Intervention: Paediatrician advice based on 5As (1-5 mins). S-H materials for mother. Asked to meet a nurse or health educator who provided MI during visit (mean 13 mins), tailored around 10 goals. Up to 3 phone calls over 3m from nurse 2. Control: No intervention
Outcomes	Self-reported 7-day PPA and CA at 3m and 12m Validation: CO<10 ppm, only for women followed up in person. Tabulated rates based on self report
Notes	Therapist: Paediatrician + nurse or counsellor Quality of MI: Paediatricians received 15 mins training; therapists received 8 hrs training in MI and a comprehensive intervention manual. Supervision throughout study period to ensure the quality of MI.

<b>Risk of bias</b>		
<b>Item</b>	<b>Authors' judgement</b>	<b>Description</b>
Adequate sequence generation?	No	"choosing a Ping-Pong ball out of a brown paper bag"; always at least 4 balls, but proportions could be varied.
Allocation concealment?	No	Not stated

**Curry 2003** (Continued)

Blinding? All outcomes	Unclear	“Data collection staff had no involvement in treatment delivery”
Free of other bias?	Unclear	Equal losses to follow up; Quality of MI was adequate.

**Dornelas 2000**

Methods	Location: Hartford, CT, USA Setting: Hospital ward Recruitment: Consecutively admitted inpatients with acute myocardial infarction. Motivation to quit not required.
Participants	100 current smokers, randomly assigned to intervention (54) or minimal care (46). 78% M, mean age 54, 94% W. Mean cpd 29.
Interventions	1. Intervention: MI and RP. Included 1 bedside tailored counselling session 20 mins. Telephone follow up at <1, 4, 8, 12, 16, 20, 26 wks by telephone) 2. Control: advice only (about 10 min), + video and referral to local SC services
Outcomes	PPA and CA at 6 and 12m Validation: by 'significant other' for 70%; no biochem confirmation. 5 deaths by 12m, but distribution not reported so denominator unaltered.
Notes	Therapist: Psychologist Quality of MI: Counselling detail provided. No measures to ensure fidelity.

***Risk of bias***

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	“by drawing random numbers from an envelope”
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Unclear	Not stated
Free of other bias?	Unclear	MI counselling detail provided. No measures to ensure fidelity

### Glasgow 2000

Methods	Location: Portland, OR, USA Setting: Four Planned Parenthood clinics Recruitment: Female smokers attending clinic invited. Motivation to quit not required
Participants	1154 female smokers, aged 15-35, randomized to intervention (578) or control (576). Mean age 24 years. Mean cpd 12
Interventions	Both groups received 20 sec provider advice 1. Intervention: Video (9 mins) targeted at young women. 12-15 min counselling session based on motivational interviewing and barrier-based counselling, personalized strategies, stage-targeted S-H material. Offered telephone support call 2. Control: Advice + S-H brochure <i>Smart Moves</i>
Outcomes	7-day and 30-day PPA at 6m. Validation: saliva cotinine $\leq$ 10ng/ml
Notes	Therapist: 'Planned Parenthood staff'. i.e. Counsellor Quality of MI: Adequate. 2-4 hrs training. Standardized protocol. Ongoing support and supervision provided. 26% refused telephone component and 31% of remainder not reached.

### *Risk of bias*

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"A blocking size of 4 was used in randomizing consenting women at each clinic to 1 of 2 conditions under a fixed randomization schedule"
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Yes	Outcome interviewer "unaware of condition assignments".
Free of other bias?	Yes	Checks on fidelity of implementation, but delivery of follow up low (43%).

### Hennrikus 2005

Methods	Location: Minneapolis, MN, USA Setting: Four hospitals Study: The TEAM Project Recruitment: Smokers admitted as Inpatients (all diagnoses) to any of the hospitals. Motivation to quit not required.
Participants	2095 current smokers, randomized to A (advice only: 703), A+C (Advice and counselling: 696) or UC (modified usual care: 696). Mean age 47, 47% M, 78% W, mean cpd: not stated.

**Hennrikus 2005** (Continued)

Interventions	<p>1. Intervention A: 2 S-H manuals + directory of local SC services, + physician advice to quit (60 sec) + post-discharge letter.</p> <p>2. Intervention A+C: As Intervention A, + nurse counselling (MI + RP) for a mean of 20 mins. Follow up: 3-6 phone calls over 6m (median 10 mins per call). More frequent calls if quit attempt. NRT or bupropion use encouraged but not supplied.</p> <p>3. Control: modified usual care: 2 S-H manuals tailored for inpatients + directory of local SC resources, + post-discharge letter.</p>
Outcomes	<p>7-day PPA at 12m  Validation: Saliva cotinine (&lt;15ng/ml)  12m denominators corrected for deaths (A+C: 27, UC: 17).</p>
Notes	<p>Therapist: Physician + nurse  Quality of MI: Details of counselling described. Training of nurses recorded. Regular meeting throughout study period.  Only data from interventions A+C and control are used in this review</p>

**Risk of bias**

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"randomized to one of three treatment conditions by looking up the next available group assignment on a list on which the three conditions were randomly ordered within blocks of 30 assignments"
Allocation concealment?	Yes	see above
Blinding? All outcomes	Unclear	Not stated
Free of other bias?	Unclear	Details of counselling described. Training of nurses recorded. Regular meeting throughout study period

**Hokanson 2006**

Methods	<p>Location: Minneapolis, MN, USA  Setting: International Diabetes Center  Study: Diabetes and Reduction in Tobacco Study  Recruitment: Current smokers or recent (3m) quitters enrolling in a diabetes education programme, contacted by study nurse. Motivation to quit not required</p>
Participants	<p>114 adult smokers with Type 2 diabetes, randomized to intervention (57) or usual care (57). Mean age 54, 57% M, 88% W. Mean cpd 21</p>

**Hokanson 2006** (Continued)

Interventions	Both groups received the BASICS diabetes education programme. 1. Intervention: individual SC and RP counselling using MI (20-30 mins) at the initial study visit + 3-6 telephone counselling sessions (each avg 11 mins); NRT or bupropion offered to quit attempters. 2. Control: Written information and referrals to local SC programmes
Outcomes	7-day PPA at 3 and 6m. Validation: saliva cotinine (6m only). Not all quitters tested, tabulated data based on self-report only.
Notes	Therapist: research staff Quality of MI: Adequate. Staff received 12 hours of training on SC and MI + ongoing support from study personnel familiar with MI. Use of NRT and bupropion similar across both groups.

**Risk of bias**

Item	Authors' judgement	Description
Adequate sequence generation?	Yes	"a computerized randomization scheme assigning subjects in blocks of 4"
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Unclear	Not stated
Free of other bias?	Unclear	No fidelity monitoring reported. 50% attrition rate by final follow up

**Hollis 2007**

Methods	Location: Oregon USA Setting: Community-based telephone quitline programme Recruitment: Callers invited to participate; assumed to be fully or partly motivated to quit.
Participants	4614 smokers randomized to: Brief counselling (872, no NRT; 868, with NRT), Moderate counselling (718, no NRT; 715, with NRT), or Intensive counselling (720, no NRT; 721, with NRT). 40% M, mean age 41, 90% W. Mean cpd 21.
Interventions	Factorial design; 3 levels of counselling, +/- offer of nicotine patches. No face-to-face contact. Intervention 1. Brief counselling (usual care), 15 min call + referral material + tailored S-H materials. Intervention 2. Moderate counselling: 40 mins counselling based on MI + 1 brief call to encourage use of community services, tailored S-H materials. Intervention 3. Intensive counselling: As 2, plus offer of $\leq 4$ additional telephone calls. Each call incorporated MI techniques, stage assessment, RP as needed. NRT offered free to the 'with NRT' groups.

**Hollis 2007** (Continued)

Outcomes	30-day PPA at 6 and 12m Validation: none Includes cost effectiveness assessment.	
Notes	Therapist: Experienced telephone tobacco counsellors Quality of MI: Counsellors received additional training in MI, close adherence to intervention protocol, using computer-driven scripts. Calls taped for quality assurance. Groups 2&3 combined vs Group1 in MAs.	
<b>Risk of bias</b>		
<b>Item</b>	<b>Authors' judgement</b>	<b>Description</b>
Adequate sequence generation?	Yes	"a computer algorithm randomly assigned participants"
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Yes	"Trained assessors blinded to treatment condition conducted follow-up assessments"
Free of other bias?	Unclear	None noted.

**McClure 2005**

Methods	Location: WA, USA Setting: Group Health Co-operative, a staff-model integrated health care organization. Recruitment: Women smokers with an abnormal pap smear or colposcopy invited to participate. Motivation to quit not required.	
Participants	275 women, randomized to intervention (138) or control (137). Mean age 33, 82% W. Mean cpd 14.	
Interventions	Both groups allowed to use NRT or bupropion. 1. Intervention: ME telephone counselling; as usual care + ≤ 4 x 15 min proactive calls, focused on motivation building and strengthening, action plans for quitting or RP strategies, depending on readiness to quit. 2. Control: usual care: a letter explaining the association between cervical cancer and smoking, S-H booklet, contact information for a phone-based SC treatment programme.	
Outcomes	7-day PPA at 6 and 12m CA (=PPA at 6 and 12m) at 12m. Validation: CO<10ppm or salivary cotinine, at 12m only. Modified 'bogus pipeline' used at 6m assessment. Data are based on self report only.	

McClure 2005 (Continued)

Notes	Therapists: Counsellors Quality of MI: Adequate. All counsellors were trained in MI. Details of counselling methods, contents, supervision and duration documented.	
<b>Risk of bias</b>		
<b>Item</b>	<b>Authors' judgement</b>	<b>Description</b>
Adequate sequence generation?	Unclear	"participants were randomly assigned"
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Yes	"Interviewers were blinded to participants' randomization status"
Free of other bias?	Yes	All counsellors were trained in MI. Details of counselling methods, contents, supervision and duration documented

Rigotti 1997

Methods	Location: Boston, MA, USA Setting: Massachusetts General Hospital Recruitment: Inpatient smokers in medical or surgical services. Motivation to quit not required.	
Participants	615 current smokers, randomized to intervention (325) or control (325). 54% M, mean age 48, mean cpd 23.	
Interventions	1. Intervention: Brief physician advice + 1 bedside counselling session 15 mins, incorporating MI, cognitive-behavioural counselling and RP techniques. S-H materials. 1-3 brief telephone calls post-discharge. 2. Control: Usual care	
Outcomes	7-day PPA at 6m Validation: Salivary cotinine 35 deaths excluded from MA denominators at 6m.	
Notes	Therapist: Research assistant and nurse Quality of MI: Counselling by research assistant, supervised by a nurse experienced in SC counselling. Structured protocol used, but details of counselling not reported. Physicians not trained in MI.	
<b>Risk of bias</b>		
<b>Item</b>	<b>Authors' judgement</b>	<b>Description</b>

**Rigotti 1997** (Continued)

Adequate sequence generation?	No	“list of eligible smokers was put in random order and patients were recruited consecutively in this order”
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Yes	“The interviewer was blinded to patients’ group assignment”.
Free of other bias?	Unclear	Counselling by research assistant, supervised by a nurse experienced in smoking counselling. Structured protocol used, but detailed of counselling not mentioned.

**Soria 2006**

Methods	Location: Albacete, Spain Setting: Two family health centres Recruitment: Smoker making routine visits to their GPs. Motivation to quit not required.
Participants	200 smokers, randomized to intervention (114) or control (86). 47% M, mean age 38. Mean cpd 18
Interventions	1. Intervention: Three x 20-mins MI-based interviews, at intervals to suit doctor and patient. 2. Control: Brief (3 mins) anti-smoking advice Bupropion offered to highly nicotine-dependent members of both groups.
Outcomes	PPA at 6 and 12m Validation: expired CO<6ppm
Notes	Therapist: 5 family practitioners. Quality of MI: Trained in MI through role play + videos. Content of training not reported.

**Risk of bias**

Item	Authors’ judgement	Description
Adequate sequence generation?	Yes	“randomly assigned by means of a non-block table of random numbers”
Allocation concealment?	Yes	“non-transparent sealed envelopes containing the interventions”
Blinding? All outcomes	Yes	“Statistical analysis was made in blind form, without knowing the identification labels of the groups that were compared”

**Soria 2006** (Continued)

Free of other bias?	Unclear	Details of training and content of counselling not described. No reported monitoring of counselling process to ensure treatment fidelity.
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**Stein 2006**

Methods	Location: Providence, RI, USA Setting: Five methadone maintenance treatment programme centres Recruitment: Offered to smokers routinely attending maintenance clinic. Willingness to quit not required.
Participants	383 methadone-maintained adult smokers, randomized to maximal (191) or minimal (192) SC programmes. 52% M, mean age 40, 78% W. Mean cpd 27.
Interventions	All participants willing to make quit attempt offered NRT patches. 1. Intervention: Up to 3 visits from study counsellor, i.e. 1 x 30-min MI-based tailored interview, + 15-30 min quit date session, + follow-up RP session. Those not ready to quit only received 2 sessions. 2. Control: Up to 2 visits, i.e. baseline and quit date (if set). Brief advice using National Cancer Institute's 4 As model (<3 minutes), + S-H materials.
Outcomes	7-day PPA at 3 and 6m. Validation: Expired CO<8ppm.
Notes	Therapist: Study counsellors Quality of MI: Trained and monitored by modified version of MISC 1.0. All sessions audio-taped. Three experienced raters assessed 10% of sessions for validity

**Risk of bias**

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	Not stated
Allocation concealment?	Unclear	Not stated
Blinding? All outcomes	Yes	"research assistants blinded to participant group assignment"
Free of other bias?	Yes	MI training conducted and monitored to MISC standards.

CA: continuous abstinence  
 cpd: cigarettes per day  
 M: male  
 MA: meta-analysis  
 ME: motivational enhancement  
 MI: motivational interviewing  
 MISC: Motivational Interviewing Skill Code  
 PPA: point prevalence abstinence  
 RP: relapse prevention  
 SC: smoking cessation  
 TQD: target quit date  
 W: white

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

Abdullah 2005	No explicit reference to use of Miller's MI
Ahluwalia 2006	Control group received intensive intervention, i.e. 6 counselling sessions and telephone follow-up support. Not routine care/brief advice.
Baker 2006	Confounded by use of NRT in the intervention arm only.
Carpenter 2004	No explicit reference to use of Miller's MI
Chan 2005	1 month follow up only.
Colby 2005	Subjects all adolescent smokers
Cornuz 2002	Smoking cessation not the aim of the study
Emmons 2001	Smoking abstinence as secondary endpoint. Data not extractable for analysis.
Emmons 2005	NRT provided to the intervention arm only.
Erol 2008	Not randomized controlled study. Pre-post study design.
George 2000	Subjects all with schizophrenia. Not of primary interest in this review.
Gilbert 2006	No explicit reference to use of Miller's MI
Gray 2005	Quasi-experimental pilot, significant baseline differences between groups
Helstrom 2007	Participants were teenage smokers
Herman 2003	Small scale Exploratory Investigation. Total number of events =3.
Hollis 2005	Participants were teenage smokers

(Continued)

Horn 2007	Participants were teenage smokers
Kelly 2006	Participants were teenage smokers
Manfredi 2004	Complex intervention, impossible to isolate the effect of MI component
McHugh 2001	No explicit reference to use of Miller's MI
Okuyemi 2007	Confounded by the use of NRT in the intervention arm only.
Persson 2006	No explicit reference to use of Miller's MI
Pisinger 2005a	Smoking reduction study. Cessation data not extractable
Pisinger 2005b	No explicit reference to use of Miller's MI
Smith 2001	Main objective to assess efficacy of stepped-care treatment and relapse prevention
Steinberg 2004	One month follow up only
Tonnesen 1996	No explicit reference to use of Miller's MI
Wakefield 2004	Confounded by the use of NRT in the intervention arm only.

## DATA AND ANALYSES

### Comparison 1. Motivational Interviewing vs brief advice/usual care

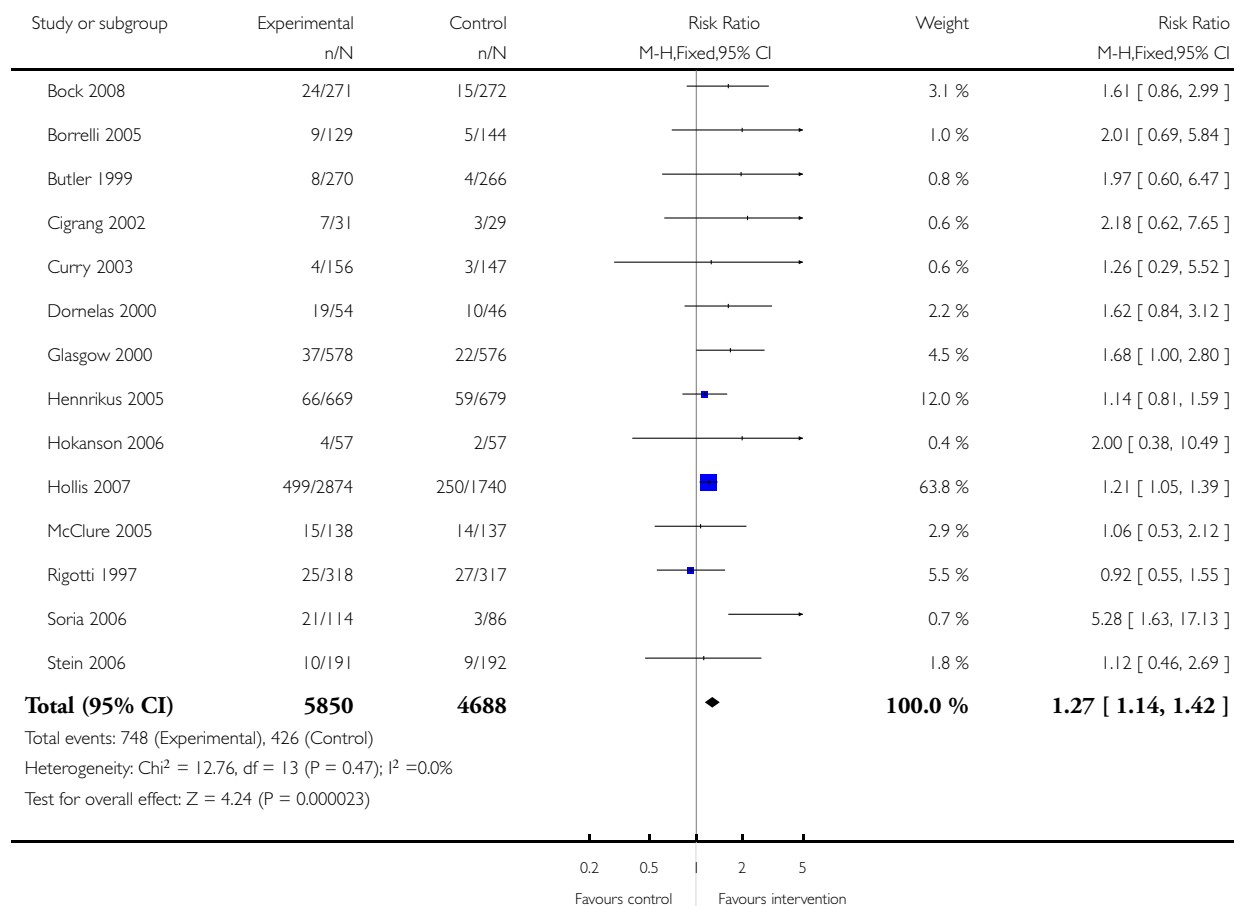
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 All studies: longest duration and strictest definition of abstinence	14	10538	Risk Ratio (M-H, Fixed, 95% CI)	1.27 [1.14, 1.42]
2 By therapist	13		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 General practitioner	2	736	Risk Ratio (M-H, Fixed, 95% CI)	3.49 [1.53, 7.94]
2.2 Nurse	4	2038	Risk Ratio (M-H, Fixed, 95% CI)	1.23 [0.90, 1.66]
2.3 Counsellor	9	7546	Risk Ratio (M-H, Fixed, 95% CI)	1.27 [1.12, 1.43]
3 By session duration	13		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
3.1 Less than 20 minutes	5	1809	Risk Ratio (M-H, Fixed, 95% CI)	1.14 [0.80, 1.63]
3.2 More than 20 minutes	8	7381	Risk Ratio (M-H, Fixed, 95% CI)	1.31 [1.16, 1.49]
4 By number of sessions	14		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Single session	10	9407	Risk Ratio (M-H, Fixed, 95% CI)	1.24 [1.11, 1.40]
4.2 Two or more sessions	4	1131	Risk Ratio (M-H, Fixed, 95% CI)	1.69 [1.09, 2.60]
5 By number of follow-up calls	13		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 No follow-up calls	3	1119	Risk Ratio (M-H, Fixed, 95% CI)	2.19 [1.23, 3.92]
5.2 One or two follow-up calls	3	876	Risk Ratio (M-H, Fixed, 95% CI)	1.77 [1.08, 2.90]
5.3 More than two follow-up calls	7	8268	Risk Ratio (M-H, Fixed, 95% CI)	1.22 [1.08, 1.37]

**Analysis 1.1. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 1 All studies: longest duration and strictest definition of abstinence.**

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 1 All studies: longest duration and strictest definition of abstinence

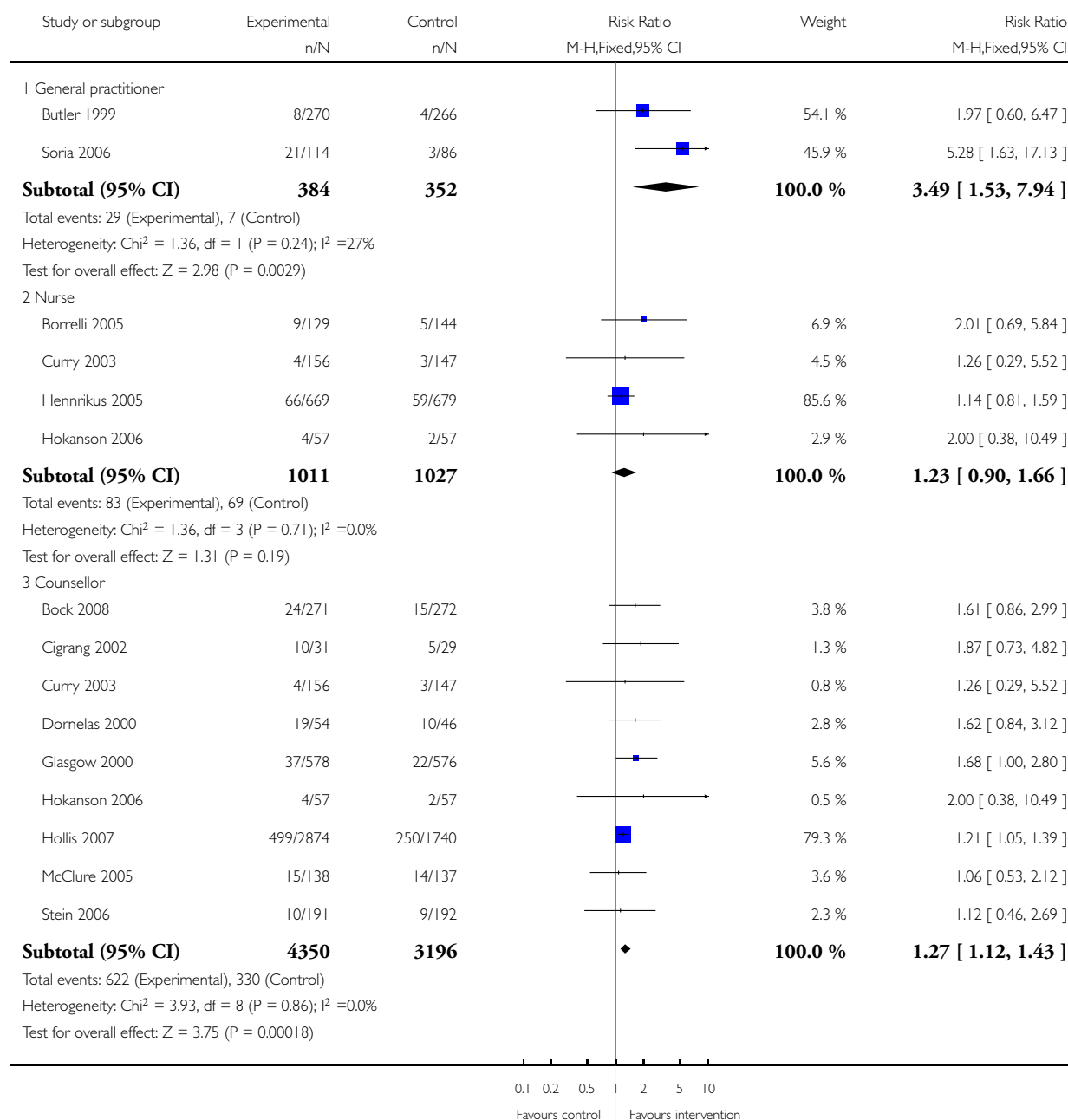


## Analysis 1.2. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 2 By therapist.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 2 By therapist

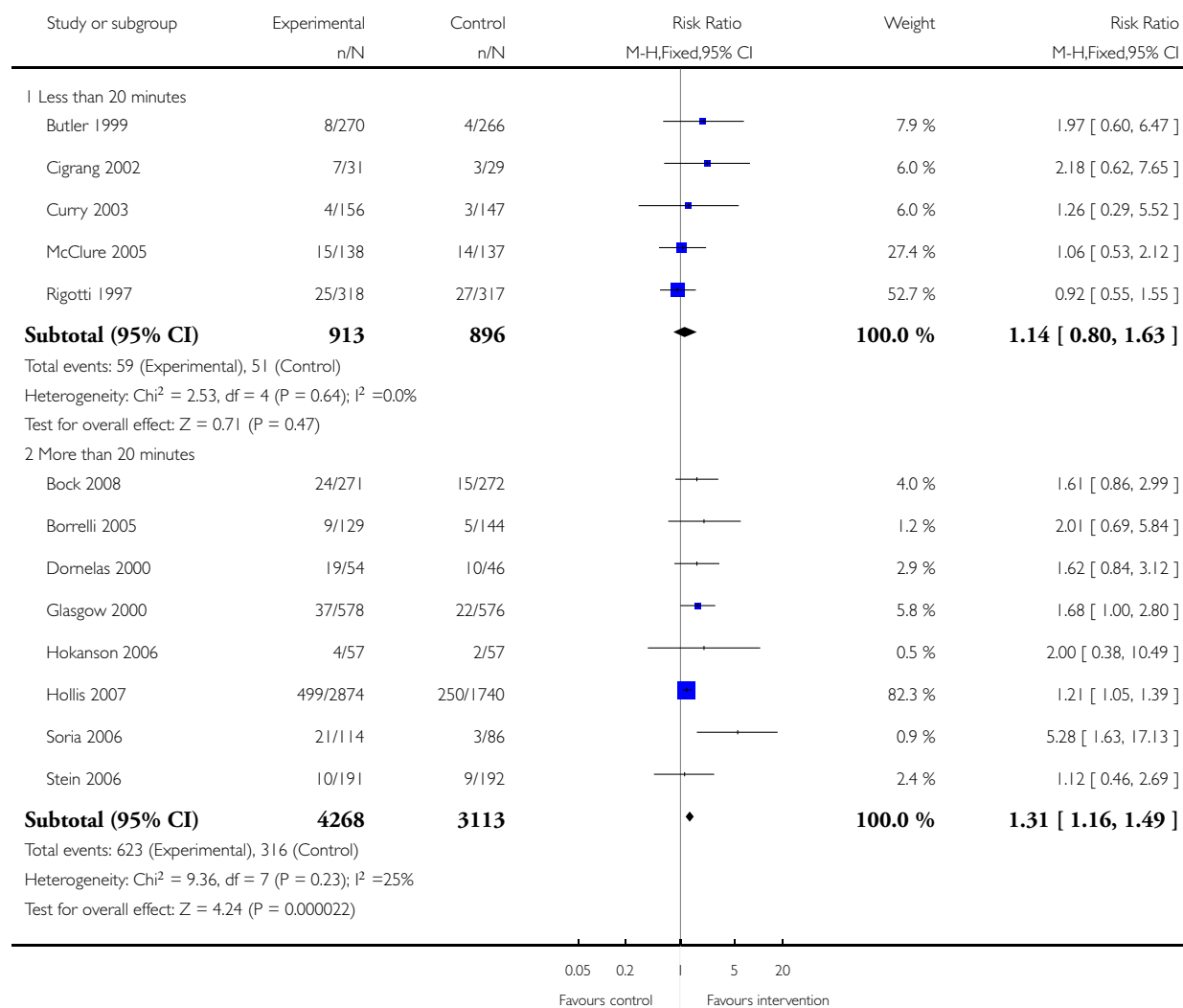


### Analysis 1.3. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 3 By session duration.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 3 By session duration

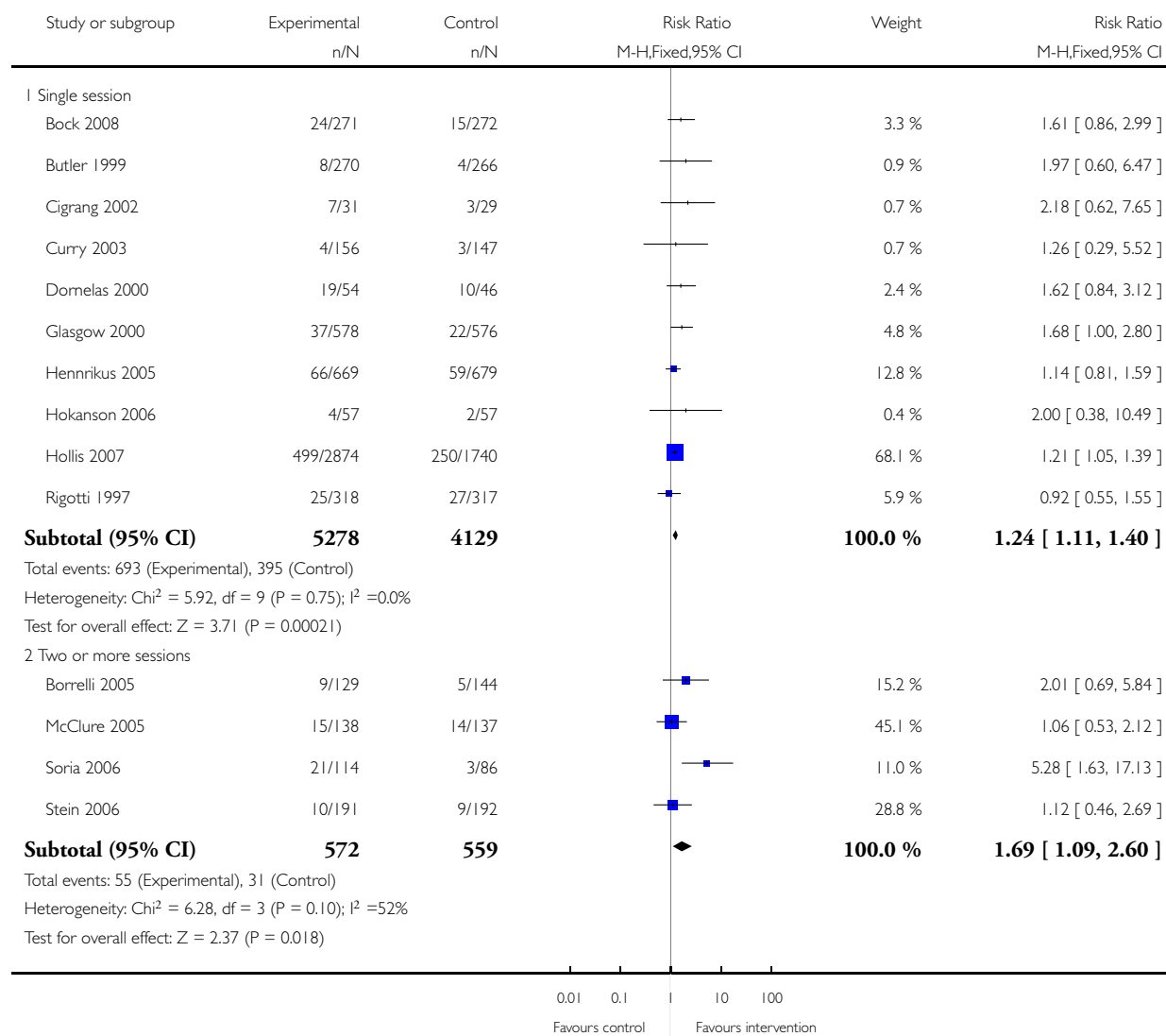


### Analysis 1.4. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 4 By number of sessions.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 4 By number of sessions

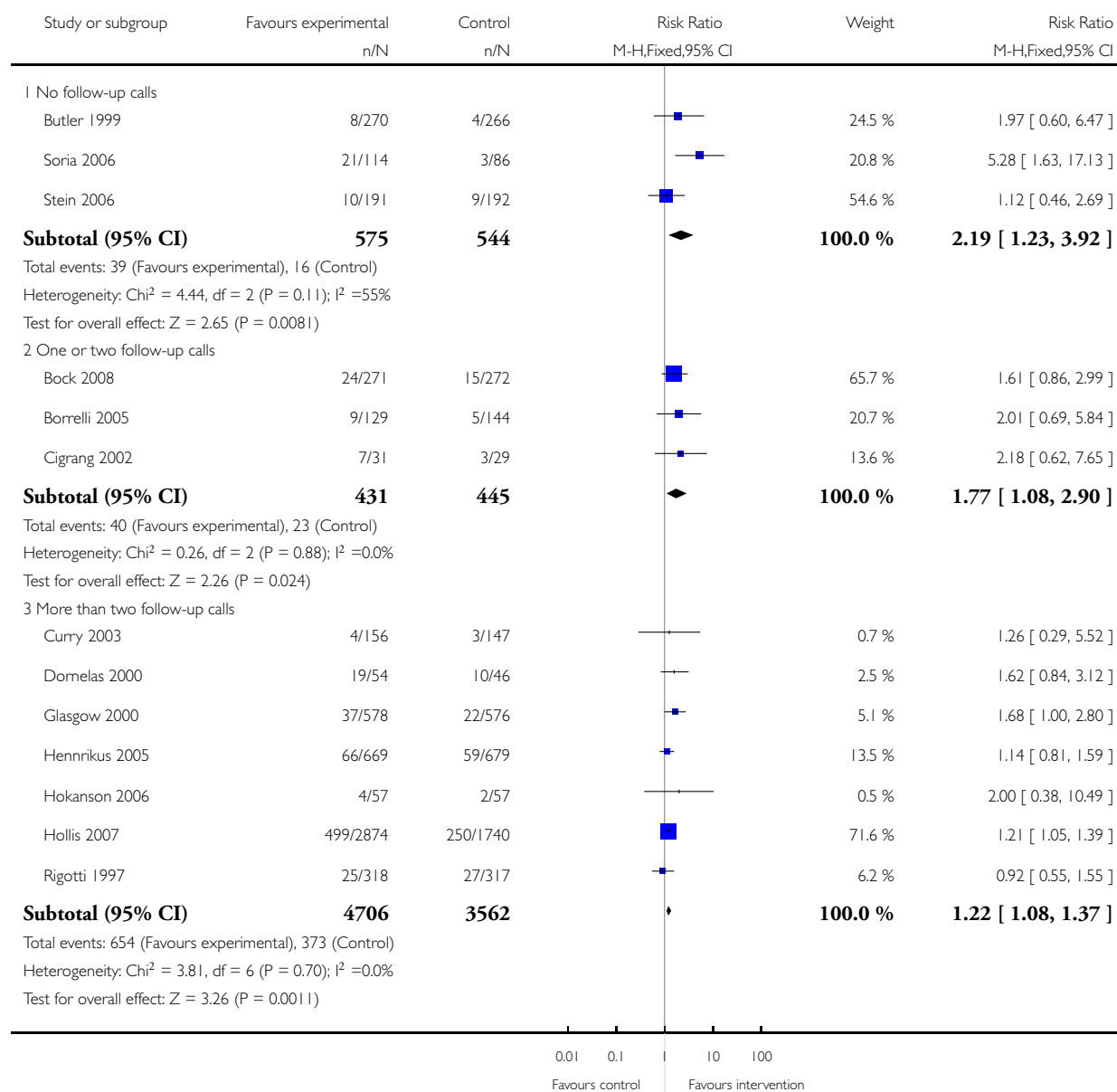


### Analysis 1.5. Comparison 1 Motivational Interviewing vs brief advice/usual care, Outcome 5 By number of follow-up calls.

Review: Motivational interviewing for smoking cessation

Comparison: 1 Motivational Interviewing vs brief advice/usual care

Outcome: 5 By number of follow-up calls



## WHAT'S NEW

Last assessed as up-to-date: 15 July 2009.

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10 February 2010	Amended	Spelling correction in tables and change in
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## HISTORY

Protocol first published: Issue 1, 2008

Review first published: Issue 1, 2010

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21 October 2008	Amended	Converted to new review format
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## CONTRIBUTIONS OF AUTHORS

DL and KC performed electronic searching, extracted data, performed the analysis and wrote the review. QY performed searching, assisted in studies selection. JL provided conceptual support.

## DECLARATIONS OF INTEREST

None known.

## SOURCES OF SUPPORT

### Internal sources

- Department of Health, Hong Kong.  
Professional Development and Quality Assurance

### External sources

- No sources of support supplied

## **DIFFERENCES BETWEEN PROTOCOL AND REVIEW**

1. Non-randomized controlled trials are now excluded, to keep the quality of the evidence as high as possible.
2. Pregnant women and adolescent smokers are now excluded, as their particular needs and circumstances warrant them being treated as separate populations. They are covered in other Cochrane reviews: pregnant women ([Lumley 2009](#)) and adolescents ([Grimshaw 2006](#)).
3. We have broadened the participant definition to 'tobacco user', and have included one trial of smokeless tobacco use cessation. Sensitivity analyses excluding this trial demonstrated no difference in the review's findings.
4. Cost-effectiveness hypothesis is now removed.

## **INDEX TERMS**

### **Medical Subject Headings (MeSH)**

\*Motivation; Behavior Therapy [\*methods]; Hotlines; Randomized Controlled Trials as Topic; Smoking [psychology; \*therapy]; Smoking Cessation [\*psychology]

### **MeSH check words**

Humans